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MONOGRAPH

OF THE

NORTH AMERICAN EMPIDIDÆ,

BY

AXEL LEONARD MELANDER.

PART I.

[From Transactions American Entomological Society, Vol. XXVIII, 1902.]

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Papers on Diptera

A MONOGRAPH OF THE NORTH AMERICAN EMPIDIDÆ.*

BY AXEL LEONARD MELANDER.

PART I.

Although at the present time a Monograph of the family Empididæ is not, perhaps, so much needed as that of some other Dipterous families, on account of the revision in 1895 by Mr. D. W. Coquillett; yet the material accumulated by Dr. Wm. M. Wheeler during several years, probably the richest collection of Empididæ on this continent, and which he has kindly relinquished—has turned the writer into this channel.

Owing to the number of species in this family, it was thought best to publish the work in two parts. For the second part the genus *Rhamphomyia* alone is left, taking *Rhamphomyia* in its broad sense as those Empidinæ with long proboscis, in which the third vein is unforked. But as this genus is one of the largest of the genera of the animal kingdom, the parts are nearly balanced.

The fine collection of these flies contains material gathered together by Dr. Wheeler since 1890, representing the endeavors of himself and of Messrs. J. M. Aldrich, C. F. Baker, G. Chagnon, James Hine, G. de N. Hough, C. W. Johnson, G. R. Pilate, W. A. Snow, H. E. Summers, S. W. Williston and Mrs. A. T. Slosson, to all of whom our greatest thanks are due.

This collection has been supplemented by most of the Empididæ gathered for the Biologia Centrali-Americana of Messrs. Godman and Salvin by Messrs. H. H. Smith and F. Gaumer. However, although so rich in material the collection is still far from being complete. Many of the previously described species are not represented. This results not from any negligence on the part of the collectors, but because the regions explored are widely separated, and because, in most cases, the collecting was confined to a few months of the year. The zeal of the collectors is apparent from the fact that of the one hundred and ninety species (omitting some of the unrecognizable ones of Francis Walker) described before our work on this family, and distributed among the genera treated in this paper, seventy-four, or nearly forty per cent. are represented in the collection. Besides these described species we have discovered eighty new forms. The fact alone, that in a collection of insects, even as superficial as this one necessarily is, and representing a family so recently revised, more than half of the species are new shows the enormous work yet to be done in systematic dipterology. Five genera, previously unknown from this continent, are here added, and in addition four new genera are established. Another genus is erected, but as the insect represented was taken in Brazil, it does not properly come within the confines of this paper, and has therefore been added as a foot-note. Several changes in synonymy have also been effected. As an interesting note in this connection attention may be called to the fact that thirty-one years ago only eighteen genera were known to Dr. H. Loew * as occurring in North America, as compared with the thirty-seven now given. Will the genera again be doubled in the next thirty years?

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* Contribution from the Zoological Laboratory of the Univ. of Texas. No. 26.

In this paper I have attempted to gather the descriptions made by former observers, and to reduce all to English, in some cases abbreviating the original. The analytical keys are in large part based upon Mr. Schiner's excellent work on the Austrian Flies, a work which has been partially followed also in preparing the generic diagnoses.

The family Empididæ includes rather small to moderate sized flies. The smallest species of the family belong to *Drapetis* and measure only $\frac{1}{25}$ inch. The largest forms reach a length of $\frac{1}{2}$ inch. With the exception of a few brilliant, metallic Mexican species, most of the species are very modest in coloration, a sombre gray-black being the most prevalent color.

Their habitus is generally the following: an almost spherical head with large eyes, generally long pointed antennæ and a slender proboscis, directed either forward or downward; a slender body, the thorax large, the abdomen long, terminating sharply in the female and more or less club shaped in the male; the legs generally very long and slender, especially the hinder pair, though not so noticeably long as in the Dolichopodid flies.

The structural characters of the family present a wide range of variation. Perhaps the principal morphological character of a dipteron lies in the structure and neuration of the wings. We are mainly assisted by the venation in assigning a fly its systematic position, and this is because the veins in an insect's wing have become fixed through long periods of evolutionary change. If we take venation as our chief criterion, the family Empididæ consists of an incongruous assortment of genera. This is much more marked than in most other families of Diptera, so much so that what is now given as one family was formerly divided into three. In groups like the Dolichopodidæ or Syrphidæ venation is of paramount importance, and exhibits relatively little variation for all the members of the family. But in the Empididæ the number and the arrangement of the veins may vary considerably. The larger genera have the full number of veins and cells, but in the smaller forms there is a basal coalescence of the posterior veins, until the anal cell vanishes and the posterior cells become reduced to two. The next character in which Empididæ are variable is the structure of the antennæ. Here, again, the larger genera have normal three-jointed antennæ, of which the third joint is typically longer than the first or second, and bears a variable terminal style or arista. In many of the smaller genera the antennæ are reduced in length, the first and second joints may become fused into one, and the arista may become even sub-dorsal, in which case these insects, superficially at least, bear a close resemblance to the smaller Muscidæ, a resemblance which is heightened by the similarity of the wings.

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* Monogr. Dipt. N. Am., No. 1.

Work on the homology of the parts of the male hypopygium in the different genera and families of flies has made but little advance as yet. That much is to be accomplished in this line may be judged from the similar work in other groups, as for example, the happy results obtained by Prof. J. B. Smith from the study of *Lachnosterna*, and especially since the Empididæ present so large a number of interesting and anomalous forms. Even in a single genus, we may cite here *Platypalpus* or *Empis*, there is a wide range in the plasticity of similar parts. For this reason we have laid greater stress than usual upon the conformation of the male genitalia, relying not so much, however, on verbal description as upon the series of figures of the various forms.

With these words of introduction we may come to a definition of the family. Empididæ are distinguished as such from all other flies by the following combination of characters: Body chitinous; antennæ two- or three-jointed, the outer joint simple, not ringed, and provided with a terminal or sub-dorsal arista of various length; vertex not hollowed; empodia small, at least never swollen; never more than four posterior cells present in the wings, all of which are open; anal ~~canal~~ cell closed far from the border if present (except in the Mythicomyiinæ); second basal cell not confluent with the discal cell if we except some of the species of *Hemerodromia.*

In addition to these points, there are other characters peculiar to the family. The body is rather long and slender, the thorax generally very prominent. The head is nearly spherical and attached loosely to the thorax. Although never minute the head is often small, a character made pronounced by the large thorax. The eyes often occupy nearly the whole head, sometimes the males are holoptic, sometimes dichoptic; in some cases the eyes of the female are contiguous below the antennæ. Generally the females are dichoptic. Of one species both sexes may have similar eyes, or the female may be dichoptic and the male holoptic. At the insertion of the antennæ there is an emargination of the eyes, more or less deep and wide. The eyes are nearly always bare and composed of small ommatidia, which may be of uniform size or rarely larger above. Three ocelli are present. On account of the variation in the size of the eye there is a corresponding difference in the construction of the genæ. These are largest in *Coloboneura*, whereas in many of the Empididæ the eyes reach the oral margin, and the cheeks disappear. The mouth-opening is small; in some species, such as *Platypalpus hians*, it is relatively larger. The mouth may be surrounded by small bristles, but no large oral vibrassæ are ever present. The face is without a mystax, but in *Empimorpha* it is covered with long hair. The proboscis, which is generally adapted for piercing, is variable in length and structure. Sometimes it is minute and thickened, often it surpasses the head and thorax, in which case it is either directed backward or downward and is slender, or, more rarely, it is directed forward and is then generally moderately thickened. Palpi one- to three-jointed, bristly or not, projecting forward or applied to the proboscis, ribbon like and slender, to oval, short, and broad. Antennæ porrect, generally diverging, approximated at the base, of various shapes, generally three-jointed, often two-jointed. Most often the basal joints are short and the third joint longer, rarely the third joint is the shortest. The antennal appendage consists of a style or arista, terminal, except in a few genera, where it is sub-dorsal. It may be short, stubby, thick, and two-jointed, as the style, or slender and hair like, and several times the length of the antenna, as the arista. In one case (*Hilara Johnsoni*) the arista is spirally curled. The arista is never plumose. The basal antennal joints may be more or less bristly, but this is not the case with the third joint; this joint varies greatly in shape, it may be short and stunted, rather large and globose, oval, or lanceolate. The face may be obliterated by the contiguity of the eyes, or may be broad and convex, with the clypeus prominent, nearly always bare. On the occiput the postocular bristles are more or less prominent, as are also the ocellar bristles.

The thorax is often prominent, larger than the remainder of the body and hunchbacked; though sometimes more or less flattened dorsally. The humeral angles may be prominent. The dorsum and pleuræ are generally covered with glaucous pollen. The arrangement and the size of the bristles and hairs are extremely variable. The margin of the scutellum is provided with from two to very many bristles.

The abdomen is generally long and slender and more or less cylindrical, sometimes broad and flat, consisting of five to seven segments, its hairiness variable. Ovipositor simple, generally small, sometimes projecting as in *Leptopeza;* hypopygium prominent, often large and extremely complex, generally reflexed over the abdomen. The ventral spots so characteristic of most dolichopodid genera are conspicuously present in *Coloboneura* and many *Empis.*

Legs of varying structure, often the coxæ and femora are elongated, often the femora are thickened and provided with spines below; in *Hemerodromia* the front ones are enlarged, in *Platypalpus* the middle ones, in *Hybos* the hind ones, in *Pachymeria* all, etc.; the metatarsi of the males of *Hilara* and some *Empis* are peculiarly enlarged; the legs of various species are provided with characteristic ornaments, the femora and tibiæ of some females being ciliated with scale-like hairs, while of some males they are armed with projecting structures. The arrangement of the bristles is variable, as is the amount of hair present. Pulvilli moderate, empodia small, ungues plain.

Wings normally parallel with the body, rather large, long, and narrow; neuration variable. The discal cell may be present or absent, one or two submarginal cells, and two to four posterior cells may be present, the anal cell present or wanting; if present closed far from the border of the wing (except in the Mythicomyinæ which properly do not come within the limits of this family). The front border of the wing is provided with small bristles, which in at least one species takes on the character of curved hooks. The formation of the anal angle is of generic distinction, it may be rectangularly developed or diminished to an even curve. Tegulæ small, simple, not conspicuously ciliated, halteres simple.

Little is known of the metamorphoses of the Empidæ. The larvæ are said to resemble those of the Asilidæ. They have been found in rich earth, under leaves and other decaying vegetable matter. The pupæ are free, and with two porrect points at the anterior end.

The Empididæ are all predaceous flies, though at times they are found about flowers. Many of the species fly in swarms in an ærial dance over brooks or shrubbery. Some of the smaller forms fly close to the ground and alight on stones. All are rather sluggish in movement and therefore easy to catch.

As an example of the habits of these flies we may cite *Hilara trivitatta*, the most conspicuous of the early spring insects of central Texas, and the only one that appears in numbers at that time of the year.

Coming before the Bibios and taking the place of the later-appearing Ephydridæ the flies swarm in immense numbers over the swiftly-running streams. Over open pools, especially where the water moves swiftly, the flies skim along the surface, almost all oriented alike, facing windward. By a gradual zig-zag flight they reach the windward edge of the pool, when some, hovering a moment, are blown back, while the others take a sharp turn and fly to the starting point. A part fly with the feet touching the surface of the water, others skim along a few inches higher. In the sunshine a swarm of the flies can be seen hovering and zig-zagging at a height of several feet above the brook.

When copulating the pair float on the surface, and are swiftly carried down stream. The more curious of the skimming flies come one by one to settle on the drifting pair, and then fly away to some other object. If a bit of grass be sent down stream the flies come one at a time in quick succession to it, impelled either by hunger or by the feeling of assisting a helpless object. This latter point is shown when a newly-emerged fly of the same species is set adrift. The flies gather about until a ball of dozens of individuals is floating down stream. Soon the ball collides with some object and breaks up; the flies then resume their zig-zag path up stream to their former haunts, while others gather about the floating nymph.

In these *Hilara* swarms the males are much more numerous. Their dilated fore-metatarsi perhaps serve in keeping the flies just touching the water. The females of the European species are said to fly about the bushes along the edges of the streams, but in *trivittata* they mingle with the males in their strange dance. Some of the European species form balloons of spun web somewhat similar to those made by the North American *Empis ærobatica* during courtship, as described by Aldrich and Turley (Am. Nat., Oct., 1899).

Trivittata appears regularly at mid-winter and remains nearly two months hovering over the smaller streams.

In conclusion, I desire to thank Dr. Wheeler for the use of his library, and for similar courtesies Dr. Williston, Mr. Henshaw and Prof. Comstock. For assistance in looking up bibliography I wish to express my thanks also to Miss Mabel Evans and to Mr. Henry Barroll; and especially for the kindness and liberality of the gentlemen whose collections have made this work possible I again tender my earnest appreciation.

Table of Genera.

Anal cell wanting, or if present very small and always the anal vein wanting. Fore coxæ shorter than the femora............(TACHYDROMIINÆ) 6.
Anal cell complete, when wanting the fore femora are shorter than the fore coxæ..2.
2. Body without macrochætæ; anal cell reaching the margin. (MYTHICOMYINÆ) 28.
Anal cell closed before border when present..............................3.
3. Anal angle of wing not projecting, outline of wing more or less cuneiform; fore coxæ greatly lengthened...............(HEMERODROMIINÆ) 11.
Anal angle more or less developed; wings not cuneiform in outline; fore coxæ shorter than the femora..4.
4. Anal cross-vein perpendicular or forming an acute angle with the basal portion of the anal vein; proboscis short; thorax prominent, generally hunchbacked....................................(HYBOTINÆ) 18.
Anal cross-vein parallel with the hind margin of the wing and forming an obtuse angle or curve with the anal vein; proboscis often elongate; thorax generally not hunchbacked..................(EMPIDINÆ) 29.

TACHYDROMIINÆ.

5. A portion of the anal cell present............**Platypalpus** Macquart.

Anal cell wholly wanting............6.

6. Second basal cell much shorter than the first; all the femora greatly thickened; thick-set bristly species with small eyes. **Coloboneura** gen. nov.

Not such flies............7.

7. Arista terminal............8.

Arista dorsal or subdorsal............10.

8. Front femora greatly thickened; wings sometimes variegated; front coxæ lengthened............**Tachydromia** Meigen.

Otherwise............9.

9. Last antennal joint elongate, conical............**Elaphropeza** Macquart.

Last joint short, oval, or round............**Drapetis** Meigen.

10. Proboscis short, vertical; palpi broad; front generally of an equal breadth; hypopygium large............**Stilpon** Loew.

Palpi narrow, slender; hypopygium not greatly enlarged. **Phoneutisca** Loew.

HEMERODROMIINÆ.

11. Third longitudinal vein simple, discal cell present, emitting three apical veins............12.

Third vein forked............15.

12. Legs very slender, nowheres thickened............13.

Front femora robust; eyes separated; basal cells long, anal cross-vein perpendicular............**Litanomyia** gen. nov.

13. Third antennal joint long, acuminate, proboscis incurved. **Synamphotera bicolor** Loew.

Third antennal joint short ovate; proboscis vertical............14.

14. Eyes of the male nearly contiguous; hypopygium swollen, proboscis longer than the head; anal and second basal cells subequal (European species). **Sciodromia** Haliday.

Eyes separated; hypopygium small; proboscis short; anal cell shorter than the second basal............**Oreothalia** gen. nov.

15. Head more or less flattened and horizontal; front femora greatly thickened, bristly beneath, about equalling their coxæ; when the discal cell is present it is narrow, its outer boundary short, nearly perpendicular, and generally emitting two veins to the margin, of which the anterior is furcate, or in some cases three posterior veins are present. **Hemerodromia** Meigen (sens. lat.).

Front coxæ short, femora never thickened, not evidently spinose beneath; discal cell always present, moderately large, often pointed apically...16.

16. Scutellum hairy; discal cell emitting only two veins, of which the anterior is furcate............**Roederiodes** Coquillett.

Scutellum bare, except for the marginal bristles; discal cell sending three veins to the wing margin............17.

17. Head lengthened, reaching forward; veins two and three undulating; arista very long............**Ardoptera** Macquart.

Head nearly vertical; arista moderate.....**Clinocera** Meigen (sens lat.).

HYBOTINÆ.

18. Third vein simple .... 19.
Third vein forked .... 27.
19. Anal cell shorter than the second basal .... 24.
Anal cell as long as the second basal or longer .... 20.
20. Fourth vein forked; hind femora not incrassate .... **Meghyperus** Loew.
Fourth vein simple; hind femora more or less thickened .... 21.
21. Origin of the second vein nearer to the humeral than to the anterior cross-vein. **Syneches** Walker.
Origin of the second vein not nearer the humeral .... 22.
22. Vein between the first and second basals indistinct .... **Syndyas** Loew.
Vein between the first and second basals distinct .... 23.
23. Stout, bronzed species with enormously thickened hind femora (Brazilian). **Lactistomyia** gen. nov.
More slender species of black or blue-black coloration ...... **Hybos** Meigen.
24. Three veins at the apex of the discal cell .... 25.
Two veins at the apex of the discal cell .... 26.
25. Hind legs lengthened; tibiæ straight .... **Euthyneura** Macquart.
Hind femora thickened; hind tibiæ bowed .... **Oedalea** Meigen.
26. Third antennal joint conical, with a terminal bristle **Leptopeza** Macquart.
Third antennal joint oval; bristle subdorsal .... **Ocydromia** Meigen.
27. Anterior branch of the third vein terminating in the second vein. **Blepharoprocta** Loew.
Anterior vein terminating in the costa .... **Brachystoma** Meigen.

MYTHICOMYIINÆ.

28. No discal cell; second vein ending in the costa .. **Hilaromorpha** Schiner.
Discal cell present; second vein ending in the first. **Mythicomyia** Coquillett.

EMPIDINÆ.

29. Discal cell wanting .... **Cyrtoma** Meigen.
Discal cell present .... 30.
30. Third vein simple .... 31.
Third vein furcate .... 34.
31. Proboscis not longer than the head, generally extending straight forward .. 32.
Proboscis longer than the head; generally directed backwards; antennæ plainly three-jointed .... 33.
32. Eyes of the male separated; hypopygium minute. **Microphorus** Macquart.
Eyes of the male contiguous; hypopygium large, pedunculate, and flexed to the right .... **Holoclera** Schiner.
33. Face naked .... **Rhamphomyia** Meigen.
Face provided with bristly hairs .... **Neocota** Coquillett.
34. Proboscis evidently longer than the head .... 35.
Proboscis not longer than the head .... 39.

35. All the legs of nearly equal length; hind femora much thickened. **Pachymeria** Stephens.
Hind legs longer than the others, their femora but little or not at all thickened .... 36.
36. Proboscis hanging downward or backward, and slender .... 37.
Proboscis directed forward .... **Iteaphila** Zetterstedt.
37. Face naked .... 38.
Face provided with bristly hairs .... **Empimorpha** Coquillett.
38. Metallic species .... **Lamprempis** Wheeler and Melander.
Non-metallic species .... **Empis** Linné.
39. Antennæ very short, apparently two-jointed, the last joint ovate, with a short thick style .... **Hormopeza** Zetterstedt.
Antennæ formed otherwise .... 40.
40. Proboscis shorter than the head; fore metatarsi of the male not enlarged .. 41.
Proboscis about as long as the head; fore metatarsi more or less swollen in the male .... **Hilaria** Meigen.
41. Arista short, two-jointed .... **Ragas** Walker.
Arista long, slender .... **Gloma** Meigen.

TACHYDROMIINÆ.

PHONEUTISCA Loew.

"*Phoneutisca* differs from *Tachypeza* (*i. e.*, *Tachydromia*) by the sub-dorsal seta of the antennæ, the apex of the second vein abruptly recurved, so that the second half of the costa is shorter than the third, the anterior femora less incrassate; it is distinguished from *Drapetis* by the straight narrower proboscis and the narrow elongate palpi." Loew, Cent. III, 35.

The hypopygium is not enlarged as in *Stilpon*.

Legs and wings in part infuscated .... **bimaculata** Loew.
Legs yellowish, wings clear .... **simplicior** Wh. et M.

Phoneutisca bimaculata Loew (Fig. 1).

Cent. III, 35.

Black, shining, the elongate palpi and the halteres white, anterior knees always and posterior tarsi at base often testaceous. Wings cinereous, with a black costal spot surrounding the abruptly recurved end of the second vein, veins fuscous, third and fourth veins close together and parallel. 2 mm.

Alaska.

Two males from Brookings, South Dakota (May), differ in having the palpi black. The hypopygium, together with the abdomen, forms a small club. There are no exposed parts to the hypopygium. Viewed from behind the outline is an equilateral triangle, the base above.

Phoneutisca simplicior Wheeler et Melander (Fig. 6).

Biol. Cent. Am. 1901, Dipt. Suppl. p. 375.

Black, shining; legs yellow. Antennæ short, black, third joint shorter than the second. Vertex with a purple tinge. Palpi whitish; proboscis black, about one-third the eye-height. Thorax shining black, with a faint purplish reflection, pleuræ lightly pruinose. Halteres pale yellow. Abdomen black, with a bronze tinge. Legs and coxæ yellow, tarsi darker on the last joint. Wings cinereous-hyaline, unspotted, veins strongly fuscous, third and fourth veins straight, slightly divergent. 1.5 mm.

Guerrero and Vera Cruz (Mexico).

STILPON Loew.

Separated from *Drapetis* on account of the sides of the front being parallel, not triangular, and the arista dorsal, and not apical. The hypopygium in at least two of our species is very large, and its parts widely open.

Thorax shining black, hind metatarsi dark .... 2.
Thorax cinerascent, legs yellowish .... **Houghii** sp. nov.
2. Abdomen testaceous .... **varipes** Loew.
Abdomen piceous .... **pectiniger** sp. nov.

Stilpon varipes Loew.

Cent. II, 58.

Black, abdomen testaceous, halteres fuscous, wings infuscated, second and third sections of the costa subequal. Face white pollinose. Legs yellow, anterior femora strongly incrassate, apex of middle femora and outer half of posterior femora fuscous, anterior tibiæ beyond the base infuscated, posterior tibiæ fuscous, a little thickened at the tip; tarsi subfuscous, first joint fuscous, last joint black, hind metatarsi a little thickened. First longitudinal vein and first section of the costa testaceous, basal half of fourth vein weak, rest of veins fuscous, all the veins broadly bordered with fuscous, except second half of fourth and tip of fifth. 1.7 mm.

Pennsylvania (Osten Sacken).

Stilpon pectiniger sp. nov. (Figs. 4, 5).

Male. Length 1.5 mm.—Black. Eyes contiguous below antennæ. Front but little diverging towards vertex. Antennæ yellow at base, with several stout bristles, apical joint minute, fuscous, the long seta subdorsal. Palpi and proboscis yellow. Thorax shining, abdomen piceous and not shining, except hypopygium, which is very asymmetrical, though smaller than in *Houghii*. Legs wholly yellow, except the hind metatarsi, which are incrassate, and the apical joint of tarsi; front femora thickened; hind femora above and below with a row of strong bristles, hind tibiæ inwardly and outwardly with a row of bristles, though these are not so closely placed, a little swollen at tip; middle tibiæ beneath at tip with several stout short bristles. All bristles are black. Knob of halteres elongate, well chitinized, punctulate, black, shining. Wings cinereous-hyaline, veins fuscous; first longitudinal and first section of costa not testaceous; veins not at all bordered with dusky coloration; fourth longitudinal ends at extreme tip of wing.

Two males; Milwaukee, Wis., VI, 26, 1895. New Bedford, Mass., V, 24, 1896.

This may prove to be the male of *varipes* Loew, though the piceous abdomen and lack of the dark color of the legs and unbordered veins, etc., are sufficient for specific differences in the present state of our knowledge.

Stilpon Houghii sp. nov. (Figs. 2, 3).

Male and Female. Length 2 mm.—Black, not shining. Head, thorax and abdomen cinereous dusted. Face and front cinereous, face broad in both sexes, front narrowed a little above antennæ. Antennæ short, third joint not minute though small, seta shorter than height of head, apical joint and seta infuscated. Proboscis short, thick, bent back, sordid yellow, dusky at apex; palpi sordid yellow. Thorax very bristly. Abdomen shining through the cinereous coating; hypopygium enormously enlarged, shining above. Legs yellowish, tarsi but little dusky towards tip; femora a little thickened, hind femora with a few macrochætæ on posterior surface; tarsi slender, hind metatarsi not thickened. Halteres yellowish, knob infuscated. Wings hyaline, with an opalescent tinge, nerves pale yellow; basal cells long, subequal.

Two males, one female; New Bedford (June), and Horse Neck Beach (August), Massachusetts.

I take pleasure in dedicating this curious insect to Dr. Garry de N. Hough, who has many times shown his generous spirit to all interested in Dipterology.

DRAPETIS Meigen.

Very small, shining, black or brownish, rather thick-set species. Antennæ two-jointed, shorter than the head; end joint short and rounded, with a simple terminal bristle. Proboscis short, vertical; palpi broadened, bristly at tip, shorter than the proboscis. Eyes narrowly separated in both sexes. Legs with fine pubescence; coxæ not lengthened; hind tibiæ generally ending on the posterior side in a more or less well developed brush-like process, forming a partial sheath around the base of the metatarsus. Third longitudinal vein not forked, no discal nor anal cell, first basal cell shorter than the second.

Legs mostly black..........2.
Fore femora more or less yellow..........5.
2. Halteres black; hind tibiæ with no bristles..........3.
Halteres white; hind tibiæ lighter, with several bristles on outer side..........4.
3. Third (fourth) abdominal segment large; fore tibiæ lighter; antennæ larger; veins stronger..........**nigra** Meigen.
Abdominal segments normal; legs uniformly dark; antennæ small; veins weak; hypopygium biparted..........**dividua** sp. nov.

4. Third antennal joint oval; hind tarsi and metatarsi with dense brush of yellow hairs on outer side.......................... **nitida** sp. nov.
   Third antennal joint elongate; hind legs with no brush or with a small one of orange hairs.................................. **medetera** sp. nov.
5. Yellow or reddish yellow; fourth abdominal segment black. **flavida** Williston.
   Thorax black, abdomen fuscous to black..................................6.
6. Third and 4th longitudinals widely divergent; species less than 1⅓ mm. long....7.
   Third and fourth longitudinals at most subparallel, larger..................8.
7. Pile of thorax yellow; antennæ fuscous; halteres fuscous. **minuta** Williston.
   Pile of thorax black; antennæ black; halteres whitish..**divergens** Loew.
8. Halteres infuscated..9.
   Halteres white...11.
9. Posterior basal cell but little longer than anterior.........................10.
   Second basal cell two times first; costa not thickened..**latipennis** sp. nov.
10. Abdomen fuscous, shining; antennæ yellowish; pleuræ yellowish; pleuræ yellowish; wings darker at base; legs light yellow. **pubescens** Loew.
    Abdomen mostly opaque black; antennæ infuscated; pleuræ black; wings uniform; legs darker; costa thickened between first and second veins; marginal cell at tip of first vein one half the width of submarginal; third and fourth longitudinals ending close together; wings with brownish tinge.................................**apicis** Williston.
11. Legs pure luteous..14.
    Posterior femora dark in part..12.
12. Posterior femora dark at apex, light at base; coxæ yellowish; hind metatarsi darker than other joints. 13
    Posterior femora reddish at tip, black at base; coxæ black; hairs of thorax intermixed with black; third and fourth veins subparallel; tarsi darker towards tip.................................**unipila** Loew.
13. Stout; 3d and 4th longitudinals converging.......**femoralis** Wh. et M.
    Less robust; 3d vein straight................**septentrionalis** sp. nov.
14. Veins fuscous; posterior basal never as much as twice as long as anterior; 3d vein almost straight; hind metatarsi infuscated..................15.
    Veins faint; posterior basal about twice as long as anterior; 3d vein with a subapical anterior curve; metatarsi not dark..**spectabilis** sp. nov.
15. Third and fourth longitudinals subparallel; hind tibiæ simple; antennæ black; palpi lutescent..............................**gilvipes** Loew.
    First posterior cell a little narrowed in the margin; hind tibiæ with a short spur; antennæ and palpi infuscated...... **xanthopoda** Williston.

Drapetis nitida sp. nov. (Figs. 10, 14, 21).

Length 2–2.5 mm., wings same. Wholly shining black. Eyes contiguous below and narrowly above antennæ. Front not broad, triangular. Last antennal joint nearly oval, little longer than deep. Occiput not pruinose. Body with short sparse hairs, besides the black macrochætæ. Scutellum with two long bristles. Halteres whitish. Abdomen of male generally blunt, of female generally pointed, segments of subequal length; hypopygium small, shining, legs in nature specimens totally black. Most of the specimens, however, show a tendency in the tarsi and posterior tibiæ to become lighter in color, even yellow. Legs rather short and stout, front femora thickened more than the others, posterior femora not lengthened, posterior tibiæ on hind apical third beset with a brush of golden hairs and produced to form a yellow sheath about posterior basal part of metatarsi. This ornamentation is variable in size, and generally more evident in the male. Wings cinereous hyaline, veins yellowish to brown, third and fourth subparallel at tip, in some specimens slightly converging, fourth generally attenuate at base.

Fourteen males, twenty-seven females; Monterey Co., Cal., July. Three males; Austin, Texas, March, October. One male; Granite Mountain, Texas, March 30th.

Drapetis medetera sp. nov. (Fig. 22).

Very similar to *nitida*, but readily distinguished by its smaller size and more slender legs. The posterior legs show less tendency toward the brown coloring, especially in the northern specimens, their brush is much reduced, sometimes wanting, and when present of a darker, orange color. The third antennal joint is two to two and one-half times its greatest width and pointed. Length 1.75–2 mm.

Six males, sixteen females; Idaho, Wyoming, Colorado, Arizona. A very unstable form.

Drapetis nigra Meigen (Figs. 12, 17, 24).

Four specimens from Brookings, South Dakota, do not disagree with Meigen's and others' descriptions.

The front is narrow, the eyes are subcontiguous for a long space beneath the antennæ, the hypopygium is much as in *dividua*, there are no thoracic macrochætæ, the scutellum has two apical bristles, the legs are largely piceous and the veins of the wings are strong. For the wing neuration see the figure

Drapetis dividua sp. nov. (Fig. 16, 18, 23).

Length 1.25–1.5 mm.—Obscure black. Antennæ black, third joint cordate, arista nearly two times length of antenna. Eyes narrowly separated above and below antennæ. Proboscis one-half head height, fuscous; palpi piceous, with golden hairs, rather broad. Front narrow. Occiput, thoracic dorsum and abdomen moderately shining, covered with dusky hairs; thorax without macrochætæ, scutellum with two moderately long and several shorter bristles; pleuræ shining, not metallic. Halteres black. Hypopygium horizontally cleft, covered with stiff dusky hairs at base and black ones at tip, the upper portion erect, the lower larger part terminal. Legs black, the tarsi sometimes lighter; none of the femora greatly thickened, no macrochætæ, no brush nor spur on hind tibiæ, hind femora not much bent, hind metatarsi not enlarged, a little compressed. Wings clear hyaline, costa not thickened, marginal cell at tip of first vein twice as wide as submarginal, third longitudinal vein ending much before apex of wing, fourth ends at apex, second basal a little longer than first, third and fourth longitudinal veins slightly diverging, anal angle rather full.

Twenty-five specimens. Moscow, Idaho.

Apicis, *nig~~er~~ra* and *dividua* are quite similar at first sight. Moreover, they constitute a group having the hypopygium cleft.

Drapetis latipennis sp. nov. (Figs. 11, 19).

Length 1.5-2 mm.—Black, shining; legs yellowish brown. Front moderately narrow; vertex and occiput shining, beset with dusky hairs. Eyes narrowly separated below antennæ. Proboscis black, pointed, palpi piceous, with grayish hairs, broad, mouth-parts very small. Antennæ short, piceous; third joint equal to second, flattened above, arista long. Thorax large, shining, black, notum with sparse dusky hairs, no macrochætæ; pleuræ very shining, with no hairs nor pollen; scutellum with two apical bristles; halteres piceous. Abdomen fuscous to black, hairy, segments regular, in the male segments five and six have a slightly whitish cast, in the female segments four and five have whitish borders sometimes; hypopygium not wider than abdomen; anal segments of female black. Front coxæ and femora luteous, middle and posterior coxæ and trochanters piceous, remainder of legs sordid yellow, tarsal joints not darker apically, hind legs as far as second tarsal joint sometimes more or less dark; hind tibiæ with a very small spur on posterior side and a few yellowish hairs near tip. Wings hyaline, broad, anal angle full, second vein terminates nearer first than third, marginal cell at tip of first vein three times the width of submarginal at that point, second basal cell broad, about twice as long as first, third and fourth longitudinals diverging and then subparallel, first posterior cell not narrow in the wing margin; veins not broad, though piceous.

Two males and three females; Lawrence, Kansas. One male; Milwaukee, Wis.

Drapetis apicis Williston.

Trans. Ent. Soc. Lond., 1896, iii, p. 442.

Antennæ brown, third joint small, onion-shaped. Front black, not shining. Eyes contiguous on face. Thorax black, mesonotum moderately shining, scutellum with two bristles; abdomen nearly opaque black. Legs brown, front coxæ, basal part of all the femora, hind tibiæ in part, and the proximal part of the four posterior tarsi yellowish. Front femora thickened on the proximal portion, the under border straight; middle femora less thickened, hind femora rather slender. Wings nearly uniformly tinged with brown; second and third sections of the costa subequal; third and fourth veins nearly parallel, the third terminating at the extreme tip; penultimate section of fourth vein about twice the length of the posterior cross-vein. Palpi, proboscis and halteres brown. Front and hind tibiæ without spurs. Length 2 mm.

St. Vincent, West Indies.

In addition to the characters given in the specific diagnosis, the following will help to distinguish this species from *dividua*:

Costa thickened between first and second veins; marginal cells at tip of first vein one-half the width of the submarginal cell at that point; third and fourth longitudinal veins ending close together; anal angle not strongly developed.

The antennæ are very small and the wings have a brownish tinge.

Drapetis pubescens Loew.

Cent., ii, 57.

Black, shining. Head black, shining, the hairs of the vertex fuscous. Antennæ dull yellow, the third joint and the seta sub-fuscous. Palpi dark fuscous. Dorsum of the thorax black, shining, covered with short and dense whitish pubescence. Pleuræ very pale yellow, the upper third fuscous, spotted with black. Abdomen dark fuscous, with very short pale pubescence; base of the abdomen often yellowish; ovipositor of the female longer than in the majority of the species, bent somewhat downward, black, the apex brownish. Legs whitish, with short whitish pubescence, the posterior tibiæ bearing a little longer pile above. Halteres fuscous. Wings hyaline, with a gray tinge, the basal third infuscated slightly, the fourth vein sub-arcuate, basal cells equal. Length 2 mm.

New York.

Drapetis divergens Loew (Fig. 15).

Cent. x, 62.

Black, shining. Antennæ short, black, the first two joints a little less black, often fuscous, in immature specimens even reddish. Palpi moderately broad, whitish. Hair of the vertex whitish. Thoracic dorsum closely clothed with short and somewhat appressed white pubescence, and provided above the wings with some pale yellowish hair, blackish by transmitted light. Abdomen black and shining, in immature species whitish toward the base, but the hind margins of the segments always black. Front coxæ wholly, the others, except the base, yellow. Legs yellow, the tarsi almost wholly fuscous; hind femora thicker than the middle ones, front femora thicker than the hind ones, all destitute of any long hair, except the subapical hair of the middle femora; no apical setulæ on the anterior tibiæ; apex of the hind tibiæ simple. Halteres whitish. Wings hyaline, veins yellowish toward the base, otherwise fuscous; the first vein is so little curved, and the second so strongly arched, that the second section of the costa is very short; third longitudinal vein slightly bent, the first portion more strongly recurved than the outer, so that the vein joins the costa far from the apex of the wing and in a rather sharp angle; third and fourth veins strongly diverging toward the apex; posterior basal cell much longer than the anterior. Length 1 mm.

Texas, Alabama, Georgia, New Mexico.

Drapetis minuta Williston.

Trans. Ent. Soc. Lond., 1896, iii, p. 442.

Eyes of male closely contiguous above and below the antennæ. Vertical triangle and occiput black, whitish pruinose. Antennæ light yellow; third joint as long as the first two together, half longer than wide. Thorax black; mesonotum shining, clothed with dark hair. Scutellum with two bristles. Abdomen black, moderately shining. Legs light yellow; all the femora moderately thickened, the front pair more so than the others. Wings nearly hyaline; second vein deeply concave anteriorly; third vein widely divergent from the fourth, the first posterior cell widely open.

A cotype specimen measures 1.3 mm.

St. Vincent, West Indies.

Drapetis unipila Loew.

Cent. x, 60.

Black, very shining. Antennæ concolorous, the third joint short and ovate. Palpi almost black. Thoracic dorsum provided with short cinereous pile and some scattered longer black hairs. Abdomen black, the second segment, except the apical margin, and the third sometimes at the base, dull whitish. Trochanters reddish-brown. Femora black, except the reddish apex, the front ones strongly thickened towards the base, the hind ones moderately thickened, middle femora not thickened; all the femora provided at the base below with a single hair, the hind one, however, finer and more difficultly seen; moreover, the front femora bear on each side, the middle ones on the front side, a subapical hair, the hind femora bear on the forward side two long hairs, one subapical, the other a little more distant from the apex; the anterior tibiæ beyond the reddish base often fuscous and provided with apical setulæ; hind ones badious or reddish, above, except the base and apex, often fuscous and there armed with the long hair, much further from the apex than from the base; apex of the hind tibiæ dilated, so that the tarsus is inserted not at the apex but a little before it. Anterior tarsi dark brown, toward the base often reddish, hind ones reddish; last joint blackish always, the three preceding often fuscous. Halteres whitish. Wings hyaline, veins pale yellowish brown; first and second longitudinals moderately and evenly curved, the third meeting the costa a little before the apex of the wing, slightly sinuous over all and slightly incurved toward the apex, fourth slightly sinuous, and almost parallel with the third; posterior basal cell much longer than the anterior. Length 2 mm.

Texas.

Drapetis femoralis Wheeler et Melander (Fig. 13).

Biol. Cent.-Am. 1901, Dipt. Suppl. p. 375.

Shining black; front and proboscis black; antennæ and palpi fuscous; front broad; halteres whitish; legs yellowish brown, four anterior femora darker above, hind femora darker on distal half, tarsi darker, especially hind metatarsi, which are equal in length to the remainder of the tarsus; hind tibiæ with a short thick terminal spur; wings grayish, veins strong, brown, third and fourth veins gently curved towards each other near the tip, posterior basal cell twice the length of the first. 2 mm.

Mexico, Vera Cruz and Tabasco.

The scutellum has four fine marginal hairs. On the outer side the hind tibiæ have a strong preapical bristle. The pubescence of the thorax is white.

Drapetis septentrionalis sp. nov.

Very similar to the preceding, but differs in its much smaller, more graceful stature. The hairs of the thorax are less conspicuous, dusky and white intermixed; the marginal bristles of the thorax are stouter and likewise the two on the scutellum. The spur of the hind tibiæ is much reduced. The third and fourth longitudinal veins are straight and diverge but very slightly; the first basal cell is three-fourths as long as the second. Length 1.5 mm.

A single male; Battle Creek, Michigan (J. M. Aldrich).

Drapetis spectabilis sp. nov. (figs. 9, 20).

Length 2–2.5 mm. Very similar to *xanthopodus* Williston, differing as follows:

spectabilis.	**xanthopodus.**
Eyes almost touching just above antennæ.	Eyes wholly separated above.
Arista once and a half antenna.	Arista three times antenna.
Thorax prominent in front.	Thorax globose.
Scutellum with two long bristles.	Scutellum with four long bristles.
Abdomen depressed.	Abdomen subcylindrical.
Wings hyaline.	Wings cinereous hyaline.
Nerves flavous.	Nerves saturate fuscous.
First posterior wider in margin than at tip of first vein.	First posterior narrower in margin than at tip of first vein.
Second basal twice first.	Second basal shorter.
Third vein sinuous.	Third and fourth subparallel.
Marginal wider than submarginal cell.	Marginal not wider than submarginal.
Hind femora not strongly curved.	Hind femora bowed, more robust.
Hind tibiæ with no subapical bristles.	Hind tibiæ with two subapical bristles on outer side.
Hind tibiæ with three long hairs on outer side proximally.	Hind tibiæ without these.
Metatarsi not dark.	Hind metatarsi darker than rest.

Both species possess a small though well-marked brush of yellow hairs on inner side of posterior tibiæ.

Five males, seven females; Woods Holl and Horseneck Beach, Massachusetts, July–August.

Drapetis xanthopodus Williston.

A specimen from Georgia very closely resembles the type from the Island of St. Vincent, West Indies. The thorax is less brilliant, however, and the legs are more dusky.

One specimen; Galveston, Texas.

In this connection may be noted a slip of the pen in the appendix to Dr. Williston's "Diptera of St. Vincent." *Xanthopodus* is there called *flavipes*, its manuscript name (not *flavipes* of Macquart), and *flavidus* is called *xanthopodus*.

Drapetis gilvipes Loew.

Cent. x, p. 61.

Black, very shining. Antennæ black, shorter than in *unipila;* third joint short and round-ovate; seta very long. Palpi dull yellow. Thoracic dorsum covered with short blackish pubescence; except for the sides and hind margin, devoid of longer black pile. Pleuræ provided with no pollen at all, very shining. Abdomen black and shining, the second, third and fourth segments of the described specimen dusky whitish, the hind margin of each black; in older specimens, perhaps, the whole abdomen is black. Legs, together with the coxæ, strong yellow, the hind metatarsi and the apex of all the tarsi fuscous or almost black. Middle femora stronger, but not thickened, the other femora moderately and evenly thickened. Front and middle tibiæ armed with apical setulæ; apex of the hind tibiæ simple. Halteres whitish. Wings cinereous, veins dark fuscous; first and second veins but very little curved, the third vein nearly straight, meeting the costa a little before the apex of the wing, fourth subparallel with the third, not undulating, the apical third of its last segment, however, bending back slightly; posterior basal cell longer than the anterior. Length 1.3 mm.

Texas, Bosque Co.

Drapetis flavida Williston.

Trans. Ent. Soc. Lond., 1896, p. 308.

Yellow or reddish yellow; head and the fourth abdominal segment black. Occiput, vertical triangle and the front black. Eyes contiguous below the antennæ, subcontiguous above. Antennæ yellow, the third joint sometimes brownish. Thorax reddish yellow, mesonotum shining, with light colored hair and bristles; hind tibiæ in the male with a stout curved spur at the tip; hind femora less thickened than the middle ones; the front pair considerably thickened. Wings hyaline; the outer portions of the third and fourth veins parallel or very slightly divergent. Length 2–2.5 mm.

St. Vincent, Hayti, Vera Cruz, Orizaba, Yucatan, Louisiana.

ELAPHROPEZA Meigen.

Small, *Platypalpus*-like species. Antennæ apparently two jointed, the end joint lengthened, with a long arista. Proboscis shorter than the head, vertical; palpi shorter than the proboscis. Face narrow, vertex a little broader. Legs but little thickened. Wings with unforked third vein and with no discal nor anal cell; cross-veins approximated.

But one species in our fauna. The genus was not discovered on this continent before.

Elaphropeza montana sp. nov. (figs. 7, 8).

Length 2 mm. Black, shining. Eyes contiguous below the antennæ. Proboscis small, black, palpi lutescent. Antennæ yellow or fuscous at the base, third joint lanceolate, conical, black, bearing a short, stout, terminal arista, whose length equals the third joint. Vertex shining, sides of face nearly parallel; occiput a little pruinose. Dorsum of thorax, pleuræ and abdomen very shining, black; notum devoid of bristles or hairs, though all the specimens may be rubbed; scutellum with two fine, dusky bristles. Hypopygium small, appendages concealed. Legs, including the coxæ, yellow, last joint of tarsi black; legs slender, tibiæ spurless, no bristles, except the small setulæ on the under side of the middle femora—as in *Platypalpus*. Halteres small, whitish. Wings clear hyaline, veins light fuscous, not thick; first basal very little longer than the second, almost its equal in length; third and fourth longitudinals straight, parallel on outer portion; no trace of an anal cell; anal angle not prominent, rounded.

Eight males and one female; Colorado, C. F. Baker.

The structure of the middle legs is very much like that of certain *Platypalpus*.

PLATYPALPUS Macquart.

Rather small flies, the largest species measuring but 4 mm. Body generally black, with yellowish legs. Wings not spotted. Antennæ apparently two-jointed, with a terminal arista. Proboscis shorter than the head. Eyes of both sexes separated on the vertex. Hypopygium not large, forming a rather blunt ending to the abdomen. Front and middle tibiæ much thickened, generally with spines beneath. The middle tibiæ ending in a spur. Wings with the third vein unforked, all the cross veins near the middle of the wing, no discal cell, anal cell present, its cross-vein perpendicular to the wing margin, sixth vein abbreviated more or less basally.

The generic names *Platypalpus* and *Tachydromia* are chosen, not because they are believed the correct solution of an entomological controversy, but rather because most of the North American species have been described under them.

Femora more or less black .... 2.
Femora wholly yellow .... 8.
2. Front tibiæ incrassate .... 3.
 Front tibiæ not incrassate .... 4.
3. Large species .... **trivialis** Loew male.
 Small species .... **pachycnemus** Loew. ✓
4. All the tibiæ black .... **monticola** sp. nov.
 Tibiæ more or less yellow .... 5.
5. Third antennal joint short, oval .... 6.
 Third antennal joint lengthed, lanceolate .... **pluto** sp. nov. ✓
6. Second basal cell considerably the longer .... **incultus** Coquillett.
 First and second basals subequal .... 7.
7. Femora with a well-marked black dot; tibiæ yellow .... **apicalis** Loew. ✓
 Anterior femora black above, the others black apically; tibiæ black apically (Alaska) .... **diversipes** Coquillett.

8. Thorax yellow in large part .... 9.
Thorax wholly black .... 15.
9. Head black .... 11.
Head yellow .... 10.
10. Head narrow .... **tersus** Coquillett.
Head broad .... **flavirostris** Loew. ✓
11. Thorax with black vitta .... 12.
Thorax with no vitta .... 13.
12. Proboscis mostly yellow .... **mesogrammus** Loew. ✓
Proboscis black; wings elongate .... **caligatus** sp. nov.
13. Front femora somewhat thickened .... 14.
Front femora not thickened .... **flavirostris** Loew.
14. Proboscis wholly black .... **lætus** Loew.
Proboscis yellow at base .... **impexus** sp. nov.
15. Legs slender, femora subequal .... **vicarius** Walker.
Middle femora at least enlarged .... 16.
16. Tibial spur wanting; posterior cross-vein nearly perpendicular .... 17.
Spur of middle tibiæ present; cross-vein oblique .... 19.
17. Abdomen wholly shining; thoracic bristles yellow .... 18.
Abdomen pollinose; some bristles black .... **canus** sp. nov. ✓
18. Mouth-opening very large .... **hians** sp. nov.
Mouth-opening normal .... **inops** sp. nov.
19. Antennæ wholly black .... 20.
Antennæ in part yellow .... 25.
20. Tarsi strongly annulate .... 21.
Tarsi uniform or at most weakly annulate .... 22.
21. Third antennal joint long, lanceolate .... **æqualis** Loew. ✓
Third antennal joint short, oval .... **trivialis** Loew female.
22. Both third and fourth veins subparallel with axis of wings, abdomen not pollinose .... 23.
Either third or fourth sinuous, bending backwards; abdomen pollinose. **incurvus** sp. nov. ✓
23. Hind metatarsi yellow, at extreme tip dark .... 24.
Hind metatarsi uniformly dusky .... **gravidus** sp. nov. ✓
24. Species 2 mm. long, wing 2 mm., arista equal to antenna... **hastatus** sp. nov.
3 mm. long, wings 5 mm., arista longer than antenna ... **caligatus** sp. nov.
25. Proboscis black .... 26.
Proboscis yellow .... **tenellus** sp. nov.
26. Front end of pleura to the posterior side of the front coxæ, also lateral margins of the metanotum, encroaching slightly on the pleura, opaque, gray pruinose (Alaska) .... **gilvipes** Coquillett.
The smooth "plaga" much reduced in size .... 27.
27. Sixth vein not obsolete at the base .... 28.
Anal cell incomplete; tarsi annulate .... **crassifemoris** Fitch. ✓
28. Middle tarsi of the male black, the front tarsi whitish, of the female all the tarsi annulate .... **discifer** Loew.
Tarsi more uniform .... **lateralis** Loew.

Platypalpus trivialis Loew (Figs. 26, 34, 43).
Cent. v, 76.

Two males among a lot of *Platypalpus* taken by Dr. Garry de N. Hough on June 12th at New Bedford, Mass., are presumably associated with a large female taken at the same time. The female is evidently the same form as was described by Dr. Loew as *trivialis*. If these males are the other sex of *trivialis*, we have another case of great sexual dimorphism.

Male.—Length 3.5 and 4.5 mm., wings same. Middle and front femora black, except apical fourth; front femora ciliate, with long white hairs beneath; front coxæ black, middle ones piceous, hind ones dusky; front tibiæ even larger than in the female; scutellar bristles rather small in comparison with the size of the species; humeri more conspicuous than usual; hypopygium not large, rounded, with a small stiff fringe of yellow hairs on the left side; under side of second basal cell strongly sinuous; first posterior cell quite wide in its third quarter; costa thickened at insertion of first vein.

The male differs from *pachycnemus* Loew in being double the size. Aside from the following points the description of *pachycnemus* will answer for this species:

Antennæ black; posterior femora wholly yellow; anterior femora strongly incrassate; tibiæ wholly yellow; tarsi yellow, apex of each joint sharply black, the amount of black increasing on the distal joints; anal vein rather strong.

The front femora of the female of *trivialis* are not ciliate, the other femora not blackened, and the second basal not strongly sinuous.

D. C., Maine (O. Sacken).

Mr. Coquillett claims to have received this species from Santa Fé, New Mexico, from Mr. Cockerell.

Platypalpus caligatus sp. nov. (Figs. 27, 35, 46).

The discovery of the male of *trivialis* shows that the insect mentioned in the Biologia Centrali-Americana as related to *trivialis* must be a distinct form. The points of difference are:

Male.—Length 3 mm., wing 5 mm. Legs, including coxæ, yellow, front femora and tibiæ less thickened; cilia of lower occiput, coxæ and femora shorter and fewer in number; tarsi not annulate; scutellar bristles black; hypopygium smaller and with a longer yellow fringe on left side; venation weaker, underside of second basal straight; sides of first posterior cell less sinuous, anal angle less prominent.

Female.—Size of body and of wings as in male. Tarsi not annulate; thoracic macrochætæ black; anal angle rounded, third and fourth longitudinals less sinuous.

One male, three females; Omilteme and Amula in Guerrero, Mexico. Alt. 6000–8000 feet. July, August, September.

The peculiar variation shown by one specimen may be mentioned again. This individual, apparently the most mature, has the side of the mesonotum and the pleuræ luteous, a curious departure from the usual black thorax. This specimen has also the base of the third vein and the underside of the second basal cell very strong.

Platypalpus pachycnemus Loew.

Cent. v, 77.

Black, shining, dorsum of thorax and scutellum opaque, with cinereous pollen. Antennæ fuscous, third joint short, ovate. Coxæ light testaceous, darker basally, femora piceous, apex of all and upper side of the posterior pair testaceous, anterior and middle tibiæ fuscous, anterior tibiæ incrassate, lighter at base and beneath, middle tibiæ with a large spur, posterior tibiæ yellowish, darker at tip; middle tarsi black, posterior tarsi testaceous at base, darker at apex, front tarsi darker at base than at apex. Third longitudinal vein incurved, converging with fourth.

District of Columbia (Osten Sacken).

In the shorter diagnosis Dr. Loew mentions that the first basal cell is the longer. This error is corrected in the main description.

Platypalpus monticola sp. nov. (Fig. 41).

Black, not shining, head and thorax covered with grayish white pollen. Face and front broad, gray pollinose. Antennæ black, third joint defective. Palpi black, with gray hairs; proboscis black, two-thirds the height of the head. Thoracic bristles yellow; scutellum with two long, yellow, terminal bristles. Abdomen and hypopygium shining, black. Halteres reddish. Legs firm, but not much thickened, front femora but little thicker than hind ones, middle femora a little stronger, front tibiæ not incrassate, spur of middle tibiæ moderately strong. Whole of legs black, except the brownish knees. Wings cinereous-hyaline, veins firm, fuscous, third and fourth parallel, nearly straight; second basal cell the longer, its outer vein oblique; anal vein almost wholly gone.

Male and female. Length 1.5–2.5 mm.

Four specimens; Colorado and Cameron Pass, Colorado, July 31st; 11,800 feet.

The only species yet found with black tibiæ.

Platypalpus pluto sp. nov. (Fig. 39).

Black. Antennæ black, third joint lanceolate, lengthened, arista equal to length of the antenna. Face rather narrow, grayish; front moderately gray-brown pollinose; occiput but little shining. Palpi and proboscis small, black. Thorax moderately shining, gray-brown pollinose on dorsum and gray on pleuræ, except usual smooth intercoxal space; its macrochætæ black; scutellum with two terminal bristles. Knob of halteres yellowish white, first joint of pedicel infuscated. Abdomen shining; hypopygium shining, not large; last two segments of female abdomen not shining, with fuscous hairs, styles short. Coxæ black, front ones anteriorly and middle ones on outer surface with whitish hairs and bristles; all femora black, except reddish at knees; middle femora moderately thickened, front femora less, hind ones not at all; tibiæ reddish, spur on middle ones moderate; tarsi blackish, except dusky at extreme base. Wings hyaline, with faint brownish tinge; veins strong, fuscous, anal vein usually obsolete at base; second basal cell the longer, its outer vein oblique, first posterior cell broadest in the middle, converging towards ends. In the female there is usually a coalescence for a greater or less distance of the costa and first longitudinal. Length 2–2.25 mm.

Sixteen males and eleven females; San Diego Co., California, March.

Seven specimens from Juliaetta, Idaho, appear to belong to this species. The veins are weaker, the legs less strongly black, and the palpi dusky. One female; Albion, Idado (J. M. Aldrich).

Platypalpus apicalis Loew.

Cent. v, 79.

Black, shining. Head less shining, face closely white pollinose. Antennæ black, the third joint short ovate, the base narrowly luteous. Proboscis black; palpi whitish. Side margins of the thorax and the pleuræ very obsoletely white pollinose, moderately shining. Abdomen shining. Legs, together with the coxæ, yellow, the last tarsal joint black, front and hind femora above marked with an ovate black spot; front femora moderately thickened, middle femora a little thicker than the front ones, with short black hairs below; the apical tooth of the middle tibiæ short. Wings hyaline, veins fuscous, toward the base yellowish, the third and fourth longitudinal veins parallel; first basal cell equal to or a little longer than the second; the posterior basal cross-vein complete; sixth vein abbreviated toward the base. Length 2.2 mm.

Pennsylvania. Common at Wood's Holl, Mass.

Platypalpus diversipes Coquillett.

Proc. Wash. Acad. Sci. vol. ii, 1900, p. 422.

Black, palpi and halteres whitish, legs yellow, bases of coxæ, upper side of the front femora, broad apices of the other femora, of tibiæ, and whole of tarsi, except base of first joint, black; third joint of the antennæ only slightly longer than broad; front femora considerably thickened, about two-thirds as thick as the middle ones; first and second basals subequal, veins yellowish brown. Length 1.5 mm.

Alaska (Kincaid).

Platypalpus incultus Coquillett.

Proc. Nat. Mus. 1896, p. 439.

Black, shining, including the pleuræ. Front coxæ yellowish, others black; front and middle legs yellowish, upper and lower sides of femora blackish brown; tarsi and hind legs, except bases of tibiæ, blackish brown; front femora slightly thicker than the others, middle femora scarcely as thick as the hind ones; legs destitute of long bristles or pile. Knob of halteres yellow. Veins brown; second basal longer than first by three times the cross-vein at the end of the first. 2 mm.

Southern California; Texas (Brues).

Platypalpus tersus Coquillett.

Proc. Nat. Mus. 1896, p. 439.

Yellow, except eyes and arista black. Third antennal joint short, oval. Front femora twice as thick as the hind ones, middle femora one-half thicker than the front ones. Third and fourth veins parallel, second basal longer than the first; sixth vein obsolete on basal fourth. Length 2-3 mm.

Georgia and North Carolina (Coquillett); Georgia and Louisiana (Pilate).

Platypalpus impexus sp. nov.

Related to *tersus* Coq. and to *lætus* Loew. The following are its distinctive characters:

Head black, yellow-pollinose. Thorax not shining, closely covered with yellowish tomentum. Proboscis yellow, infuscated apically. Pleuræ closely yellow tomentose; the usual clear space is rather small. Front and middle femora subequal, twice as thick as hind femora, middle femora with much reduced spines and with yellowish hairs. Spurs of middle tibiæ smaller than in the allied forms; apex of each tarsal joint narrowly but distinctly black. The fourth vein is slightly sinuous and bends back at the tip, so it there diverges slightly from the third.

One female; Brookings, South Dakota. One female; Battle Creek, Michigan.

Platypalpus lætus Loew.

Cent. v, 81.

Yellow, shining, head cinereous; proboscis black; third joint of antennæ and tarsi piceous; spur of middle tibiæ rather large. Wings yellowish, veins yellow, third vein straight, fourth vein lightly curved towards third; first basal cell a little shorter than the second. Length 2.2 mm.

New Hampshire (Osten Sacken).

Platyaplpus flavirostris Loew.

Cent. v, 80.

Yellow, reddish above, shining, head cinereous, proboscis yellow, last joint of the antennæ black, last joint of the tarsi fuscous, except at base; apical spur of middle tibiæ small. Veins pale yellow, third vein very slightly curved towards the fourth; basal cells equal, sixth vein not obsolete at base. Length 2.6 mm.

New Hampshire (Osten Sacken).

Platypalpus mesogrammus Loew.

Cent. iii, 38.

Yellow, shining. Antennæ, palpi and proboscis, except tip, yellow. Head black. A median thoracic vitta rufescent. Scutellum, except lateral angles and abdomen, black, shining. Wings hyaline, third and fourth longitudinal veins parallel, straight. Length 1.5 mm.

New Jersey, Pennsylvania, District of Columbia, Tennessee.

Platypalpus vicarius Walker.

Trans. Ent. Soc. Lond., N. Ser., iv, p. 149.

"Black, shining; legs testaceous, slender, nearly equal in size; wings limpid, veins testaceous, externo-medial veins very slightly curved." Length 2 mm.

"United States."

Platypalpus canus sp. nov. (Figs. 29, 40, 45).

Length 1.5–2 mm. Head black, base of antennæ, proboscis and palpi yellow; third antennal joint short, more or less fuscous, arista black, equal to antenna; proboscis a little shorter than head-height. Face narrow. Thoracic bristles mostly black; scutellum with two long bristles. Head, thorax and abdomen with slaty pollen, pleuræ completely covered. Halteres pale yellow. Hypopygium piceous, its outer parts freer than usual. Legs, including coxæ, yellowish, tarsi dusky apically, femora slightly thickened, front and middle subequal, hind femora not thickened, front tibiæ incrassate, compressed, a little more slender than the front femora, middle femora beneath with no setulæ, but with dusky setæ, middle tibiæ with no setulæ nor terminal spur. Wings clear, veins light fuscous, anal angle not prominent, anal cell open, second and third veins nearly parallel, posterior cross-vein nearly a continuation of the anterior.

Thirteen specimens; Los Angeles Co., California, December.

Platypalpus hians sp. nov. (Figs. 32, 36, 37).

Length 2–3 mm. Black, shining where tomentum is rubbed. Head, thorax and pleuræ with gray-green tomentum. Face moderately broad, gray pollinose. Proboscis about one-half the head height; palpi short, whitish. Mouth-opening large, as in the Ephydridæ. Antennæ short, basal joint reddish yellow, apical joint lanceolate, pointed, its arista equal to itself. Postocular and thoracic bristles yellow; all on scutellum moderately long. Halteres reddish yellow. Abdomen black, with a greenish reflection, as in also the pleural plaga. Hypopygium rounded. Legs, including front coxæ, reddish; tarsi piceous from tip of first joint, middle and hind coxæ concolorous with pleuræ; femora moderately thickened, middle ones the most, black, setulæ of middle femora prominent, middle tibiæ two-thirds the length of femora, front tibiæ not incrassate. Wings clear, anal angle moderately prominent, veins narrow, fuscous, lighter at base, third and fourth subparallel, first and second basals equal, posterior cross-vein nearly perpendicular to wing margin, anal cell faintly closed.

One male and three females; Colorado.

Platypalpus inops sp. nov.

Closely related to *hians*, but readily distinguished by the following characters:

Face narrow, gray-white pollinose; front narrow. Palpi narrower, longer, pinkish to reddish. Mouth-opening not large. Antennæ black, plainly 3-jointed, arista longer than antenna, third joint short, ovate, blunt. Legs lighter, of a purer yellow color, tarsi generally markedly annulate; middle tibiæ with a trace of an infuscation at tip. The middle tibiæ are nearly the length of the femora. Scutellar bristles shorter, especially the lateral ones. Anal angle of wing less prominent, anal vein stronger, and anal cross-vein more oblique. The rest of the neuration is the same.

Seven specimens; Dubois (7200 feet altitude), and Hunter's Creek, Wyoming, September 6–10, 1895 (Wm. M. Wheeler); Oxford, Idaho (J. M. Aldrich).

Platypalpus incurvus sp. nov. (Figs. 31, 33, 44).

Length 2–2.5 mm. Head, thorax and abdomen black. Proboscis short, black; palpi white to piceous. Antennæ elongate, black, third joint lanceolate, arista its equal. Face narrow, white to whitish. Vertex and thoracic dorsum with green-brown dust merging to slaty below and on abdomen. Upper portion of occiput with black bristles, lower with white ones; thorax with black bristles. Halteres yellow. Basal half of each abdominal segment with a coating of slaty dust, outer half shining. Hypopygium terminal or flexed to the right, small to moderately large, with a fringe of yellow hairs on left side. Legs light yellow; tarsi slightly dusky, a little darker at tip of each joint, sometimes almost annulate; legs slender, front femora but little thickened, a little larger than front tibiæ, which are enlarged and slightly compressed. Wings clear, nerves weak to brown; second basal a little the longer, anal vein generally moderately strong, sometimes the third vein is parallel with the costa, sometimes both the third and fourth are reflexed at the tip, meeting the wing margin beyond the apex of the wing.

Twenty specimens, the males predominating; Los Angeles Co. and San Diego Co., California, December and February.

It seems quite probable that this species is in a state of division. As a general rule the smaller hypopygium, weak venation, straighter third vein and light-colored palpi are correlated, but this is not universally true.

Platypalpus gravidus sp. nov. (Figs. 25, 42).

Black, except legs, wings and halteres. Face grayish, moderately narrow. Palpi dusky red; proboscis a little shorter than head. Third antennal joint lanceolate, in length equal to its arista. Thoracic bristles black. Abdomen shining, with sparse whitish hairs; hypopygium not large. Pleuræ slaty, with usual plaga. Legs yellow-testaceous, front coxæ more or less black at base, other coxæ varying from yellow to black; all the tarsi largely, evenly, dusky to piceous; front femora moderately, middle more strongly, hind not, incrassate; spur of middle tibiæ moderate, black at tip. Wings with browish tinge, veins fuscous, strong; third vein straight, except extreme tip, first posterior cell a little wider in the middle, narrower just before apex, second basal cell longer than the first, its outer vein oblique, anal cell open behind. Average length 2.5 mm.

Sixteen males, thirty females; San Diego Co., California, February and March.

Platypalpus lateralis Loew.

Cent. v, 78.

Black, shining. Head subopaque, cinereous. Antennæ black, third joint short, lanceolate, yellow basally. Proboscis black, palpi black. Sides of thorax and greater part of pleuræ opaque white pollinose. Abdomen shining black. Legs including coxæ yellow; tarsi annulate basally, fuscous or black apically, apical spur of the middle tibiæ small. Wings hyaline, veins fuscous, third and fourth subparallel, basal cells equal, sixth vein whole. 2.5 mm.

New Hampshire (Osten Sacken).

Platypalpus discifer Loew.

Cent. iii, 36.

Black, shining, dorsum of thorax, scutellum and metanotum with luteous pollen, occiput and pleuræ with opaque white pollen. Antennæ ochraceous, black at tip. Palpi and legs yellow. Anterior tarsi of male white, and closely white pubescent, middle tarsi of male black, first joint depressed; posterior tarsi of male and all the tarsi of the female black apically. Wings subinfuscated, base of costa and first longitudinal lutescent, rest of veins strong, dark fuscous, third and fourth veins convergent, anal cell complete. 2.6 mm.

District of Columbia (Osten Sacken).

Platypalpus hastatus sp. nov. (Fig. 30).

Black, head and thorax dusted with olive-green tomentum. Face narrow, white dusted, the dust with a slight yellowish shade. Antennæ piceous to black, third joint broad, one and one-half times as long as deep, it height equalling the length of the first joint, arista shorter than antenna. Palpi small, whitish in the male, yellowish red or fuscous in the female. Proboscis black, a little shorter than height of head. Lower part of occiput and of pleuræ slaty-gray pollinose. Scutellum with two long apical yellow bristles. Halteres whitish, broad. Abdomen black, shining, with sparse, short, light-colored hairs; hypopygium shining, flexed to the left, large; genital styles of the female fuscous; venter shining. Legs including coxæ yellow, tarsal joints slightly dusky apically; front coxæ with coating of white hairs anteriorly; femora not greatly thickened, middle ones largest, hind femora not thickened; spur of middle tibiæ moderate. Wings clear, veins light yellow, third and fourth longitudinals nearly straight, subparallel, second basal cell the longer, its outer vein oblique, anal cell open behind, sometimes wanting. 2-2.5 mm.

Four males and six females; Lawrence, Kansas. One female from Craig's Mountain, Idaho.

Platypalpus æqualis Loew.

Cent. v, 75.

Black, shining. Dorsum of thorax with cinereous pollen, pleuræ largely opaque white. Legs and coxæ yellow, tarsi yellow. Antennæ black, third joint lanceolate. Palpi testaceous. Basal cells of wing equal, sixth vein not abbreviated at base, third vein very slightly incurved at apex, subparallel with the fourth. 2.5 mm.

Illinois (Le Baron).

Specimens have been examined from Mass., Mich., Ill., Wisc., La., Neb., Kans., So. Dak., Colo., Wyom., Idaho, N. Mex., Calif., Mexico.

Among these specimens, which doubtless are of a single form, the variations are extreme. Sometimes the tarsi are pure yellow, more often sharply annulate, though at times they are dusky. A few of the specimens from Wyoming have almost black feet. The legs vary from reddish brown to almost white. At times the two basal cells of the wings are equal, more often the second is the longer. The sixth vein is more or less abbreviated at the base. The face varies from white to red or fuscous, and varies also greatly in breadth. The last antennal joint is generally lanceolate, but frequently is short.

Platypalpus crassifemoris Fitch.

Oscinis crassifemoris Fitch, N. Y. Reports, vol. i (1856), p. 301.
Platypalpus debilis Loew, Cent. iii, 37 (1861).

Although Fitch's description of *Oscinis crassifemoris* is very meagre, Mr. Coquillett who had the type for examination places it with *Platypalpus debilis* Loew.

The description of *crassifemoris* is given in full:

> "The thick-legged *Oscinis* (*O. crassifemoris*) is the same size with the last (*O. coxendix*, which is 0.07 inch in length to the tip of the abdomen, and 0.10 to the end of the wings), and is black, with a white head, and the thorax with a gray reflection. The last joint of the antennæ with its bristle is black. The legs are pale yellow, the tips of the feet black. The veinlets are so near each other that they are almost united. In the female the abdomen is egg shaped and polished, its apex drawn out into a long, sharp-pointed ovipositor. The middle and anterior thighs are rather short and thick, the hind ones longer and cylindrical.

The specimens referred to this species are variable in tarsal coloring, sometimes the tarsi are yellowish, with dusky tips and sometimes annulate. The antennæ are sometimes black, in which case this species may readily be distinguished from *æqualis* and *hastatus* by the smaller tibial spur and the shape of the third antennal joint.

Massachusetts (Hough), Michigan, Idaho (Aldrich).

Platypalpus tenellus sp. nov. (Figs. 28, 38).

Length 2-2.5 mm., length of wing same.—Black, head, dorsum of thorax and pleuræ covered with gray pollen, abdomen shining. Face silvery, rather narrow; sides of front parallel. Antennæ yellow-red; third form cordiform, pointed, sometimes blackish; arista longer than antenna. Palpi and proboscis yellowish, the latter one-half of the head height. Thoracic bristles yellow, those of scutellum longer than usual. A clear space present on pleuræ in front of the middle coxæ. Abdomen of male cylindrical, a fringe on left side of hypopygium consisting of white hairs. Legs including coxæ yellow; middle and front femora subequal; front tibiæ a little thickened; spurs of middle trochanters and of middle tibiæ black; tarsal joints sometimes faintly annulate; middle femora with black setulæ, and sparsely ciliate with yellow, middle tibiæ with black setulæ. Wings clear hyaline, veins pale yellow; third and fourth veins parallel, straight; second basal cell a little longer than first, its outer vein oblique; anal cell nearly obsolete; anal angle rounded.

One male and three females; Champaign Co., Illinois, and Brookings, South Dakota.

Platypalpus gilvipes Coquillett.

Proc. Wash. Acad. Sci., 1900, p. 422.

Black, first two joints of the antennæ, palpi, halteres, legs and coxæ yellow, last joint of the tarsi brown; third joint of the antennæ about twice as long as wide. Body polished, the front end of the pleuræ to the posterior side of the front coxæ, also the lateral margins of the metanotum, encroaching slightly on the pleuræ, opaque gray pollinose. Wings hyaline, veins brown, the first and second basals subequal. 2–3 mm.

Popof Is., Alaska (Kincaid).

TACHYDROMIA Meigen.

Rather small, slender flies, devoid of much pubescence, generally black and with the wings more or less colored. Antennæ short, apparently two-jointed, the end joint with a long, outward-pointing style. Proboscis at most as long as the head; palpi with the bristles on the underside sometimes as long as the proboscis. Eyes of both sexes subcontiguous below the antennæ. Abdomen lengthened. Legs rather long, fore coxæ more or less lengthened, fore femora with small spines below. Wings as in *Platypalpus*, except that the anal cell is completely wanting, or only the anal cross vein in part present.

Wings without cross-bands .... 2.
Wings with two broad dark cross-bands .... 14.
2. Thorax reddish .... **Bacis** Walker.
Thorax black .... 3.
3. Veins bordered with brownish .... 4.
Veins not bordered .... 5.
4. Cross-veins bordered; third antennal joint dark .... **inusta** sp. nov.
Antennæ testaceous .... **vittipennis** Walker.
5. Wings unicolorous .... 6.
Outer part of wings more or less brown, clear at base .... 10.
6. Femora and antennæ wholly black .... 7.
Part of the femora more or less yellow .... 8.

7. Tibiæ and knob of halteres yellow .... **portæcola** Walker.
Tibiæ and halteres black......................... **Winthemi** Zetterstedt.
8. Front femora marked with black .... 9.
Front femora wholly yellow............................ **postica** Walker.
9. All the tibiæ yellow............ ... . **fenestrata** Say.
Middle and hind tibiæ more or less black................. **similis** Walker.
10. Legs wholly black.. 11.
Legs more or less yellow.. 12.
11. Wings with a black spot at last third of costal margin.
maculipennis Walker.
Wings infumated, except the whitish base.. .... **clavipes** Loew.
12. Anal cross-vein wanting................................ **pusilla** Loew. ✓
Anal cross-vein present .... 13.
13. Legs yellowish.. **rostrata** Loew.
Legs somewhat darkened................................... **rapax** Loew.
14. Marginal cell obliquely truncate; fifth vein ending in hind margin at the base of the outer dark cross-band .... **enecator** sp. nov. ✓
Marginal cell narrowed to the tip; fifth vein recurved, ending in the clear space...................................... **Schwarzii** Coquillett. ✓

Tachydromia Schwarzii Coquillett (Fig. 52).

Proc. Nat. Mus., 1895, p. 440.

Shining, black. Head opaque gray pollinose, the cheeks shining. Antennæ fuscous, the third joint short, conical, the apical arista bristle-like, four times as long as the antenna. Legs dark brown, the bases of the tibiæ and of the tarsi, and sometimes of the femora, yellowish. Knob of the halteres whitish. Wings whitish, crossed by two broad brown bands, the first extending from the base of the second vein to slightly beyond the posterior cross-vein, the second extending from slightly beyond the apex of the fifth vein to a short distance beyond the tip of the second vein, leaving the base of the wing, a cross-band just beyond the middle and the tip of the wing whitish; anal cross-vein wanting, the other two of an equal length, the distance between them subequal to that between the small cross-vein and the base of the third vein, the second basal cell longer than the first by twice the length of the cross-vein; distance between the tips of the third and fourth veins equal to one-third of that between the second and third veins; marginal cell about one-half as wide as the submarginal. 2.5 mm.

California, Utah, Idaho, Texas; Guerrero, Mexico.

This is not an uncommon species, as there are numerous specimens in the collection.

The apex of the marginal cell is gradually narrowed by an even curve of the second vein; the fifth vein terminates between the middle and the outer edge of the central clear band.

The two males from Austin, Texas, differ from typical examples of *Schwarzii* in their coloration. The cross bands of the wings are dark plumbeous instead of brown, and the lighter parts of the legs are white instead of brownish. These specimens were running over the sides of rather large stones at the bottom of a moist ravine in the vicinity of Mount Barker, a habit which has been observed among European species of this genus.

Tachydromia enecator sp. nov.

Female.—Head shining, black, occiput very sparsely pollinose, and with a few stiff black hairs, cheeks large; proboscis and palpi black, palpi as long as the proboscis and appressed to it, provided with short black hairs; antennæ short, black, the outer joint short, with the slender bristle-like arista more than four times the length of the antenna. Thorax, pleuræ, scutellum and abdomen shining black. Legs shining, black, except the knees narrowly piceous, and the metatarsi at the base piceous; middle and fore femora and tibiæ on their inner edge with evident short spinose hairs. Halteres black. Wings marked with brown as in *Schwarzii*, but differing in venation: near the apex of the marginal cell the second longitudinal vein turns sharply obliquely forward, and at the turn is provided with a short adventitious spur jutting into the submarginal cell. The third vein is slightly reflexed at the tip so that the first posterior cell is slightly broader at its apex than just before, the fifth vein has not so strong a bend near its base as is the case in *Schwarzii*, and therefore terminates in the wing margin within the dark cloud; anal cell completely wanting, the distance between the two basal cross-veins longer than the strong basal section of the third vein; the distance between the tips of the third and fourth veins equal to fully one-third of that between the second and third veins (in *Schwarzii* it is somewhat more than one-third).

Two females; St. John's Co., Quebec (G. Chagnon); Lance Creek, Wyoming (Wheeler).

Tachydromia Bacis Walker.

List of Dipterous Insects in the Collection of the British Museum, iii, p. 510.

"Body dark ferruginous; eyes dark red; lip tawny, as long as the head; feelers black; first and second joints dark tawny; third joint broad, nearly round; bristle very long, more than twice the length of all the preceding joints; abdomen piceous above; legs tawny, clothed with short black bristles; hind legs stout and long; wings colourless; wing-ribs ferruginous; veins piceous; poisers tawny. Length of the body 1½ lines; of wing 3 lines.

"Jamaica (Gosse)."

Tachydromia vittipennis Walker.

Trans. Ent. Soc. Lond., N. S., iv, p. 149.

"Black; antennæ and legs testaceous; wings gray, darker along the borders of the veins; halteres whitish. Length of the body 2 lines; of the wing 4 lines.

"U. S."

Tachydromia inusta sp. nov. (Figs. 50, 54).

Length 3–4 mm.—Black. Inner joint of antennæ reddish yellow, outer fuscous, rounded; style four times antenna. Palpi white, proboscis fuscous. Occiput cinereous-dusted, with a white beard below. Thorax finely and closely dusted, cinereous on the humeri and pleuræ, and lightly bronzed on dorsum;

scutellum with two well-separated erect bristles; tegular cilia golden; halteres light yellow. Abdomen depressed, cylindrical at tip in male, segments shining, interspaces gray dusted; hypopygium shining, terminal, but little larger than abdomen, its ventral fringe small, above with a projection bent to the right. Coxæ yellow; legs yellow, except following fuscous to black places: four anterior femora on outer side, except central yellowish portion, hind femora on tip on basal and apical thirds, four anterior tibiæ on outer side, and tarsi gradually towards tip; front femora much thickened, middle femora moderately, hind ones not; inner side of tibiæ and metatarsi of front legs, and femora and tibiæ of middle legs provided with small black setulæ; middle tibiæ of male with a slight depression before tip on underside. Wings not broad, grayish hyaline, veins strong, piceous, lightly clouded on cross-veins; first posterior cell narrowed towards tip, fourth vein ending just behind wing tip, anal cross-vein strong, a portion of sixth vein beyond anal cross-vein present.

Seventeen males, nineteen females. The sexes taken in copulation. Juliaetta, Moscow and Craig's Mt., Idaho, May. Magdalena Mts., N. Mexico, August.

Tachydromia portæcola Walker.

List Diptera, iii, p. 506.

"Body black, dull; eyes piceous; feelers and mouth black, the latter tawny towards the base; abdomen hairy at tip; legs tawny; thighs slightly piceous; wings gray; wing-ribs and veins piceous; poisers dark tawny. Length of body 1½ lines; of wing 3 lines.

"Hudson's Bay (Barnston)."

Tachydromia Winthemi Zetterstedt.

Dipt. Scand., i, p. 321.

Ins. Lap., 548.

Black. Antennæ, palpi, halteres and legs concolorous, metatarsi flavescent; wings infuscated, third and fourth veins subparallel. Thorax above black, opaque, humeri cinerascent, pleuræ shining, black. Coxæ sometimes yellow apically.

New Hampshire (Osten Sacken).

Tachydromia postica Walker (Fig. 53).

Trans. Ent. Soc. Lond., N. S., iv, p. 149.

"Black; antennæ, abdomen at the base beneath, and legs testaceous; hind femora and hind tibiæ piceous; wings cinereous, veins black, halteres whitish. Length of body 1½ lines; of wings 3 lines.

"U. S."

Four specimens from Lawrence, Kansas, agree with this description, and may probably belong to Walker's species. They are thus further characterized:

Dorsum of thorax and occiput lightly cinereous-dusted, pleuræ and abdomen shining. Third antennal joint elliptical. Proboscis and palpi yellowish. Beard of lower occiput short, dirty white. Thorax slender, pectus silvery. Scutellum with two well-separated short bristles. Abdomen less shining than the pleuræ, shorter than the thorax, flattened, hypopygium shining, thicker than abdomen at base, much as in *inusta*, but with a dorsal fringe in addition to the larger ventral one. Coxæ yellowish, front tibiæ piceous, front femora relatively thicker than in *inusta*. The underside of the legs is devoid of true setulæ, the front femora beneath pale ciliated. Wings narrow, third vein straight, fourth slightly arching forwards, the distance between the two greater than in *inusta;* veins fuscous, not black; second basal cell longer than the first by the length of the cross-vein; basal cells narrow, sixth vein wanting, anal cross-vein present.

Mr. Coquillett determines as this species specimens received from Prof. Cockerell and taken at Mesilla, New Mexico.

Tachydromia fenestrata Say.

Say, Jour. Acad. Phila., iii, p. 95.

Wiedemann, Aussereuropæische Zweifluegelige Insecten, ii, 12, I.

Black. Antennæ yellow; palpi white, proboscis yellowish, thorax shining black, in certain directions somewhat grayish. Scutellum with two bristles. Pleuræ jet black. Abdomen piceous, darker at apex. Wings brownish. Front femora on inner side with a black line; front tibiæ and hind femora with a piceous line on each side. 4 mm.

Middle States.

Tachydromia similis Walker.

List Dipt. Ins., iii, p. 506.

"Body black, slightly shining; eyes and mouth piceous; feelers tawny, with black tips; legs tawny; tips of feet black; fore thighs striped with black; middle shanks piceous; hind thighs and tips of hind shanks black; wings brown; wing-ribs and veins piceous; poisers tawny. Length of the body 1¾ lines; of wings 2 lines.

"Hudson's Bay (Barnston)."

Tachydromia maculipennis Walker.

List, etc., iii, 507.

"Body black, shining; eyes piceous; feelers and mouth black; legs piceous; wings nearly colourless, white at base, each with a large brown spot on fore border at two-thirds the length from the base; wing-ribs and veins piceous, the latter yellow towards the base. Length of body 1¾ lines; of wings 1½ lines.

"Hudson's Bay (Barnston)."

Tachydromia clavipes Loew.

Cent., v, 73.

Black, shining; legs including coxæ largely black, apex of anterior tibiæ strongly incrassate, wings beyond the whitish base dark, provided with a posterior basal cross-vein. Antennæ dark fuscous, proboscis black, palpi white. Hypopygium with short black hairs above. 2.6 mm.

Illinois (Le Baron).

Tachydromia pusilla Loew (Fig. 51).

Cent., v, 74.

Shining, black, proboscis and palpi concolorous, no white spot on the pleuræ; coxæ yellow; anterior legs yellow, except the upper side of the femora and tibiæ and the whole of the tarsi; middle legs like front ones, except that the whole of the tibiæ is piceous, femora beneath with black setulæ; hind legs, except luteous base of the femora, piceous. Wings cinereous, outer half of costal margin infuscated, no posterior cross-vein. 2 mm.

Illinois (Le Baron), Snow, Wheeler; Massachusetts (Hough).

Tachydromia rostrata Loew.

Cent., v, 72.

Black, antennæ yellowish, palpi white, proboscis yellow, except tip. Thoracic dorsum subopaque, pleuræ shining. Coxæ yellow; legs yellow, posterior femora and all the tibiæ partly fuscous; middle tibiæ before apex slightly emarginate. This emargination is not readily seen. Wings subfuscous, whitish basally, with a posterior cross-vein. 3 mm.

Hew Hampshire.

Tachydromia rapax Loew (Fig. 55).

Cent., v, 71.

Black; wings subfuscous, at base whitish, with a posterior cross-vein. Coxæ yellow, with a black spot, trochanters black beneath, anterior femora with an apical dot on posterior side, united on under side to a basal dot on the anterior side; front tibiæ fuscous, apical third of posterior tibiæ dark; middle tibiæ excised before apex. 3 mm.

Illinois (Le Baron).

Specimens of this species are in the collection from Massachusetts, Indiana, Illinois, Wisconsin and Wyoming.

COLOBONEURA gen. nov.

Thick set. Head globose, longer than wide, wider than deep; eyes small, two thirds the head height, inserted forwards and therefore the occiput large; three ocelli present, the posterior two approximated; occiput with stiff black bristles, longer on the upper vertex and between the ocelli; front narrowed mid-way between the ocelli and the antennæ; eyes notched at the antennæ; distance from the antennæ to the bottom of the labrum equal to that from the antennæ to the ocelli; antennæ directed outwards, short, plainly three-jointed, the third joint not longer than deep, flat above, with a dorso terminal, very slightly and finely pubescent arista, but little longer than the antenna. Labrum prominent, convex, cheeks prominent, straight below; proboscis stout, shining, folding back between the front coxæ, shorter than the head height; palpi short and broad, disc-shaped, hanging down, covered with black hairs and provided with an apical bristle. Thorax stout, cut straight in front, somewhat flattened above, densely black-bristly, a few longer bristles present along the lateral edges of the dorsum, the inner pair of short acrostichals distinct; disc of scutellum, metathorax and abdomen not bristly, scutellum with four marginal bristles. Abdomen flattened, near the centre of the lateral margins of each of the dorsal segments is a small black spot, probably the place of attachment of vertical muscles;* hypopygium small, terminal, ending in a short curved ventral process. Legs stout, all the femora greatly thickened, the hind ones reaching to the end of the abdomen; legs covered with bristly hairs; femora beneath and hind femora above near the tip with macrochætæ, tibiæ on outer side with macrochætæ; tarsi simple, the joints evenly decreasing in length, but not in thickness, pulvilli large. Wings reaching to the end of the abdomen; costa evident and provided with fine dark hairs to beyond the tip of the third vein; no indication of an anal cell; anal angle very broadly rounded, rectangular.

Coloboneura inusitata sp. nov. (Figs. 47, 48, 49).

Male.—Length 3.5 mm. Black, completely covered with silvery-gray pollen, thinning out posteriorly on the abdomen. Antennæ short, black. Proboscis shining, black; palpi piceous, gray pollinose. A small, shining, yellowish, posthumeral callosity present. Hypopygium dark piceous, with a few short, black, stiff hairs on upper left side, which consists of a small convex plate, the under right side more or less flattened and contorted. Coxæ gray pollinose; femora black, becoming fuscous at the knees, tibiæ and tarsi fuscous, last joint piceous; legs shining. Halteres short, whitish. Wings opalescent, first vein, second and third on outer half of the wing, and fifth vein on inner half pale testaceous, remaining veins very faint or wanting altogether; costal bristles black, sharply contrasting with the veins.

Two males; Wood's Holl, Mass., July 13, 1899 (Wheeler); Lake Worth, Florida (Mrs. Annie T. Slosson).

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* These abdominal spots remind one of the analogous markings of *Thelyphonus* and the similar ones of many Dolichopod genera, in which cases the spots are indicative of the attachment of the musculature, as the upper spots are connected with the lower by a series of vertical muscles.

HEMERODROMIINÆ.

SYNAMPHOTERA Loew.

The genus *Synamphotera*, strictly speaking, has not yet been taken in America. The species described by Dr. Loew, as referable to his genus, has been placed in the genus *Sciodromia* by Mr. Coquillett; but as it is not this form according to Dr. Loew's own statement it is here left as it was originally placed.

Synamphotera is partly characterized by having the third vein furcate, the third antennal joint small and provided with a very short style, from all of which the following species differs. As Dr. Loew has stated, *Synamphotera* is intermediate between *Hemerodromia* and *Sciodromia*, differing from the former by its slender legs and from the latter in the short incurved proboscis.

Synamphotera bicolor Loew.

Cent., iii, 34.

Black. Front sparsely cinereo-pollinose. The first two joints of the antennæ pale yellowish, the third long, acuminate. black, its terminal seta concolorous, shorter than the third joint. Proboscis somewhat incurved, yellowish; palpi rather long, yellowish. Dorsum of the thorax blackish, faintly cinerascent, with very sparse pollen; the humeri reddish; pleuræ marked with reddish, sometimes wholly reddish. Scutellar margin in some specimens reddish. Abdomen black. Hypopygium of the male concolorous, swollen, reflexed, the upper lamellæ minute, oblong-ovate, yellow. Legs and coxæ pale yellow, the very tip of the tarsi darkened. Wings hyaline, the veins luteous, the third vein simple. 3 mm.

Alaska (Sahlberg).

The form described as *Sciodromia mexicana* does not conform with the typical species of that genus, as the front femora are greatly thickened, the eyes separated, the proboscis shorter than the head, etc. In as much as a closely related form is in the collection it is advisable to construct a new genus for the reception of these American species. This genus may be called *Litanomyia*.

LITANOMYIA gen. nov.

Small, yellow, slender species. Head flattened, the lower part carried in front. Antennæ moderate. Proboscis short, pointed and subincurved. Eyes separated in both sexes, placed forward on the head. Three ocelli present. Occiput with a row of bristles. Thorax more or less cylindrical, shining, feebly pruinose, devoid of acrostichal bristles, but with three dorsal bristles present on each side; two scutellar bristles present. Abdomen slender, cylindrical, hypopygium somewhat swollen. Legs slender, front coxæ lengthened, as long as their tibiæ, front femora greatly thickened, as long as or but little shorter than their coxæ, bristly and spinose beneath; no tibial spurs, hind tibiæ explanate at the tip. Wings long and slender, cuneiform, third vein simple, discal cell long, not acuminate apically, emitting three simple veins to the wing margin, basal cells elongate, the first basal a little longer than the second, second basal and anal cells subequal, anal cross vein perpendicular to the wing margin, anal vein evanescent, anal angle not developed.

Thorax rufous, with a median dark streak............**mexicana** Wh. et M.
Thorax yellow, no median darker stripe..................**elongata** sp. nov.

Litanomyia mexicana Wheeler et Melander.

Sciodromyia mexicana, Biol. Cent. Am., 1901, Dipt. Suppl., p. 376.

Female.—Head black, thorax red, abdomen fuscous, legs yellow. Eyes widely separated on the front, narrowly on the face, rather small. Face silvery, front grayish. Antennæ short, first two joints yellow, third joint pointed, the terminal seta less than twice the length of the antenna. Proboscis very short, yellow. Thorax reddish, pollinose, with black macrochætæ, and with two abbreviated black vittæ in front. Halteres yellowish. Abdomen cylindrical, blunt. Legs lengthened, slender, except the thickened anterior femora; posterior tibiæ with a slight widening at extreme tip; anterior coxæ elongate, yellow, remaining coxæ reddish. Wings grayish hyaline, narrow, somewhat pointed, veins fuscous. 2 mm.

Guerrero, Mexico.

Litanomyia elongata sp. nov.

Quite similar to *L. mexicana*. It differs, however, by its lighter color and more slender form. The thorax is decidedly narrowed in front, whereas in *mexicana* it is rather square. The abdomen is fuscous in but a single specimen, all the others have the abdomen yellow. There is sometimes a fuscous spot present on the dorsum of the sixth abdominal segment. Moreover, the body is much less pruinose, the hind tibiæ lack the terminal swelling, there is no trace of the median thoracic dark stripe, the third antennal joint is rather smaller, the coxæ are concolorous with the legs, the wings are rounded at tip, and generally the costa vaguely parallel with the hind margin. The sides of the face are parallel; in *mexicana* the face is narrower centrally than above or below. The antennæ vary in color from wholly yellow to the third joint black. The thorax is sometimes even lighter medially.

Sixteen specimens; Mass., Wis., S. Dak.

The Massachusetts specimens are slightly lighter in color than the more western ones.

OREOTHALIA gen. nov.

Slender black species of the habitus of *Clinocera.* Head oval, vertical; eyes widely separated, emarginate at the antennæ, extending to the oral margin, dividing the face from the cheeks; proboscis very short, thick and flat; palpi small, broad; occiput with a row of bristles; ocelli much reduced; antennæ very short, two-jointed, the outer joint small, oval, its terminal style nearly twice the length of the antenna and slender, but thickened at the very base. Thorax rounded, devoid of acrostichals, but with two lateral rows of widely separated bristles; scutellum with two long slender bristles and four minute marginal hairs. Abdomen slender, depressed in the female, and compressed in the male; hypopygium small, terminal but reflected and of less diameter than the abdomen; female abdomen blunt and compressed at the tip. Legs very slender, nowhere thickened, the front coxæ twice as long as the others, and two-thirds as long as their femora; front femora with short spines below, on outer portion no tibial spurs; claws slender, long, empodium well developed, longer than the pulvilli. Wings slender, the third vein simple, discal cell rather long, emitting three simple veins to the margin, the second posterior cell narrow at its base, second basal and anal cells short, their outer boundary continuous, oblique, the anal vein thin and short beyond the cross-vein, anal angle poorly developed.

Oreothalia pelops sp. nov.

Length ~~8~~ 3 mm. Wholly black, sparsely coated with fine, dull green pollen. Occipital and thoracic bristles black, abdominal and pedal hairs pale. Halteres black. Hypopygium twisted to the right, elongate, the central filament superior, directed horizontally forward, lamellæ small. Empodia and pulvilli white. Wings infumated, stigmal spot faintly darker, veins dark brown, costal setulæ very minute.

Numerous specimens of both sexes. Kendrick, Idaho (J. M. Aldrich).

HEMERODROMIA Meigen.

Rather small, slender, lengthened species, of yellow, gray or black color. Antennæ with three joints, third oval, pointed, arista short, terminal. Proboscis shorter than the head, curved slightly backwards. Eyes of both sexes not contiguous. Thorax lengthened. Abdomen longer than the thorax, hypopygium larger than the abdomen. Legs long and slender, the fore coxæ much lengthened, equalling or nearly equalling the thickened fore femora. Fore femora and tibiæ usually with minute spines beneath. Wings long and narrow, the third and fourth veins forked, discal cell with two veins, anal angle not well developed.

The European *precatoria* Fallen and Walker's *albipes* are included in the table as from North America on Walker's authority. The position of *albipes* was determined from a hint of Dr. Williston, that it is associated with *precatoria*, and therefore belongs to the group *Mantipeza*.

Anal and discal cells present .... (**Mantipeza** Rondani) 10.
Discal cell united with one of the other cells .... 2.
2. Anal cell wanting .... (**Microdromia** Bigot) 6.
Anal cell present .... 3.
3. Second basal emitting three veins .... (**Neoplasta** Coquillett) 4.
Second basal with two veins, one forked ... (**Hemerodromia** Meigen) 5.
4. Filaments of hypopygium hidden .... **scapularis** Loew. ✓
Filaments of hypopygium exposed .... **mexicana** sp. nov.
5. Thorax and abdomen red .... **defecta** Loew. ✓
Thorax and abdomen black .... **collusor** sp. nov. ✓
6. Thorax partly red .... 7.
Thorax wholly black .... 9.
7. Femora with a spine-tipped tubercle at base beneath .... 8.
Femora with no such prominent tubercle .... **empiformis** Say. ✓
8. Thorax vittate .... **superstitiosa** Say.
Thorax wholly red .... **rogatoris** Coquillett. ✓
9. Front femora longer than the coxæ .... **defessa** Williston.
Front femora shorter than the coxæ .... **captus** Coquillett.
10. Wings wholly clear .... 11.
Wings with at least a brownish stigma .... 12.
11. Body uniformly fulvous to black .... **albipes** Walker.
Thorax reddish in greater part .... 14.
12. Stigma black .... **notata** Loew.
Stigma fuscous .... 13.
13. Body cinereous .... **valida** Loew.
Body light yellow, thorax brownish .... **præcatoria** Fallen.
14. Thorax darker at the margins, scutellum dark .... **obsoleta** Loew.
Thorax lighter at the margins, scutellum light .... **palloris** Coquillett.

Hemerodromia scapularis Loew (Fig. 59).

Cent., ii, 54.

Black, shining, humeri either testaceous or fuscous, rarely black, abdomen of male often nearly all black, sometimes the basal segments whitish; abdomen of the female white, black at apex, the ovipositor yellowish, its base and apex broadly black. Antennæ, proboscis, halteres and legs white. Wings hyaline, no stigma, second vein short. 3 mm.

Maryland, Maine, Pennsylvania, Tennessee, Wyoming.

The sixth vein is sometimes wanting.

This species was taken in company with *Hemerodromia collusor*. Three males, ten females.

Hemerodromia mexicana sp. nov. (Figs. 56, 60).

Male,—Length 2.5 mm. Head black, depressed. Face narrow, shining, white, lower occiput thickly covered with white pile. Antennæ and proboscis wholly yellow; last antennal joint but little longer than basal part, cordate. Thorax rather elongate, black, finely punctured; humeri testaceous, mesonotum a little depressed. Abdomen as long as the thorax, piceous, sordid above; hypopygium black, basal filament visible. Legs pale yellow; anterior femora a little thicker than the others, slightly longer than their coxæ; tarsi dusky towards tip; no bristles present. Wings hyaline, as long as the body, hind border somewhat more rounded than in *scapularis;* veins fuscous, no stigma, tip of marginal cell on a line with the end of the second basal, second basal united with the discal, sending three veins to the margin, anal vein attenuated at base.

Very similar to *scapularis* Loew, but differs in its smaller size, rather more robust form, exposed basal filaments of hypopygium, more rounded wings, stronger patch of infraocular pile and less depressed mesonotum.

One male from Orizaba, Mex., December, 1887.

Hemerodromia collusor sp. nov. (Figs. 57, 58, 64)

Length 3.5-4 mm.—Black, thorax covered with bronzed-gray pollen, abdomen finely gray pruinose. Head depressed; vertex and occiput cinereous-dusted; face moderately narrow above, wider below, candid, with slight yellowish tinge. Mouth opening large. Palpi whitish, proboscis reddish, its extreme tip black; proboscis directed backwards, a little longer than the antennæ. Antennæ reddish, short, thick, third joint ovate, pointed, its terminal arista black, thick, short, less than one-half of the length of the third joint. Ground color of the thorax and abdomen black, overlaid with bronzed dust on the notum and cinereous on the pleuræ; mesonotum depressed on the posterior half; scutellum with two closely placed, moderately long, dusky bristles. Abdomen compressed, a little longer than the thorax; hypopygium somewhat shining, erect, with dusky bristles at tip, in height equal to three abdominal segments; ovipositor somewhat recurved, black dorsally, fulvous at base and ventrally. Legs yellowish; front legs raptorial, coxæ two-thirds the length of the femora, femora thickened, with dusky bristles beneath, together with minute black setulæ, tibiæ provided with erect small hairs and an apical bristle; middle and hind legs slender, with no bristles, sometimes the apical joints of the tarsi are dusky. Halteres yellow. Wings hyaline, veins yellow, marginal cell not stunted, third and fourth veins forked, discal cell united with the second basal, sending out two veins to the margin, anal cell complete.

Seven males and fifteen females; taken at Dubois, Wyoming, and Dinwiddie Creek, Wyoming, by Dr. Wheeler, at an altitude of 7200 feet, during the early part of September, 1895.

One female collected by Prof. C. F. Baker in Colorado.

Hemerodromia defecta Loew.

Cent., ii, 55.

Whitish, apex of the hypopygium and the last two joints of the tarsi subfuscous. Wings hyaline, the first basal cell longer than the second, stigma obscure. Antennæ and proboscis white. 3 mm.

District of Columbia.

The described specimen is immature.

Hemerodromia superstitiosa Say.

Say, Complete Writings, i, 256.
Long's Expedit., ii, Append., 376.
Wiedemann, Ausseur. Zweifl. Ins., ii, 11, I.

Whitish, thorax and abdomen with a broad black vitta; antennæ, proboscis and vertex white, lower part and back of head piceous. The vitta is lighter in color medially. Scutellum with paler margin. On the abdomen the vitta may be constricted to a row of spots. Wings hyaline. Halteres and legs white. 4 mm.

Northwest Territory, not northwest Penn. (cf. Wiedemann).

Hemerodromia rogatoris Coquillett (Fig. 65).

Proc. Nat. Mus., 1896, p. 392.

Head black; thorax, scutellum, metanotum, pleuræ and sternum light red. Abdomen in middle of dorsum brownish red, the seventh segment wholly light yellow. Hypopygium large, projecting both above and below the abdomen, reddish brown. The large blunt tubercle near the base of the front femora bears on its summit a stout spine directed obliquely forward. 4 mm.

North Carolina (Coquillett), Wisconsin, Wyoming (Wheeler).

Of the specimens in the collection the hypopygium is black, with an erect basal filament. No thoracic macrochætæ are present. The eyes are as in *empiformis* Say, widely separated above the antennæ and very narrowly in the middle below. A mutilated specimen from Louisiana (Pilate) resembles these in the parts remaining. It has, however, strong black bristles on the underside of the front femora.

Hemerodromia empiformis Say.

Ochthera empiformis Say, Compl. Writ., ii, 85.
Hemerodromia vittata Loew, Cent., ii, 56.
" sp. *innominata* Williston, Trans. Ent. Soc. Lond., 1896, p. 440.
(?) *Tachydromia oratoria* Fallen, Empid., 13.

In regard to this species there is another entomological muddle, the following solution of which seems the most practicable. The species was described by Mr. Say as an *Ochthera*, but, as Dr. Loew pointed out, it probably is a Tachydromine. It is put in Osten Sacken's catalogue in the genus *Hemerodromia*, as a synonym of *vittata* Loew. In the Diptera of St. Vincent, Professor Williston describes a *Hemerodromia* from that island, which he suggests is the same as Say's species, and probably the same as *H. oratoria* Fallen.

As there are but a few specimens in the collection which can be referred to Say's *empiformis*, it would be premature to assert that all four species are synonymous, although the specimens agree in all the salient characters with each description.

For this reason there will be no change in the synonymy in the present paper, and the species may still be known as *empiformis* Say.

Empiformis Say.--Body whitish; head cinereous, antennæ whitish, rostrum pale; thorax dusky above; feet white, anterior thighs dilated, robust, emarginate behind the inferior middle for the tip of the tibiæ, and armed beneath with distant, equidistant, rather long setæ, tibiæ incurved at tip and mucronate, armed beneath with approximate, short setæ, intermediate and posterior feet white, tips of the tarsi blackish; abdomen deep black, immaculate. 2.5 mm.

Inhabits Illinois; New York (*vittata* Lw.), St. Vincent (sp. *innominata* Willist.), Pennsylvania.

Hemerodromia defessa Williston.

Trans. Ent. Soc. Lond., 1896, p. 439, Pl. XIV, fig. 166.

Head and thorax shining, deep piceous or black, lower part of face and occipital orbits gray pollinose. Eyes broadly contiguous on face. Antennæ light yellow, the third joint as long as the first two together. Bristles of thorax and scutellum wholly inconspicuous. Abdomen opaque black, venter yellow. Legs light yellow. Wings nearly hyaline, anterior cross-vein a little beyond the middle of the basal cells. Proboscis light yellow. 2–3 mm.

St. Vincent, West Indies.

Differs from *captus* Coquillett in the shining head and thorax.

Hemerodromia captus Coquillett.

Proc. Nat. Mus., 1895, p. 391.

Head black, white pollinose. First antennal joint one-half the length of the second, the third two and one-half times as long as the second, broadly oval, the apical third styliform. Eyes widely separated (male). Thorax opaque gray pollinose. Wings hyaline, second basal cell exceeding the first by about twice the length of the cross-vein at the apex of the second.

New York (Coquillett).

Hemerodromia albipes Walker.

List Dipt. Ins., iii, p. 505.

"Body slender, hoary, with a slight tawny tinge; eyes dark red, mouth tawny; feelers pale tawny; black towards tip; legs pale yellow; tips of feet piceous; wings colourless; wing ribs pale yellow; veins tawny, pale yellow towards base; poisers yellow. 3–4 mm.

"Hudson Bay Territory (Barnston)."

Hemerodromia notata Loew.

Cent., ii, 53.

Whitish, a median vitta of the fusco-testaceous thorax, the scutellum, metanotum and the abdomen black. Wings hyaline, discal cell oblong, quadrangular, second posterior cell longer than its petiole; stigma rounded, black. Legs yellowish, last tarsal joints black. 3 mm.

Illinois (Le Baron).

Hemerodromia valida Loew.

Cent., ii, 51.

Stout, cinereous; legs and balteres dark yellow. Discal cell of wings oblong, quadrangular, second posterior cell much shorter than its pedicel, anal cell obliquely truncate, stigma dilutely subfuscous. Dorsum with two narrow, rather obscure vittæ. Posterior tarsi apically fuscous. 4 mm.

Hudson Bay Territory.

Hemerodromia præcatoria Fallen.

Fallen, Empidæ, 10, 12, 34.

Meigen, System. Beschr., iii, 62, etc.

Pale yellow. Thoracic dorsum shining, brown, with a median rather broad, grayish vitta. Antennæ yellow, brown apically. Vertex and face silvery. Abdomen above with a broad (brown) stripe, emarginate at incisures. Tarsi hardly darkened towards tip. Wings with brown veins. 4 mm.

Hudson's Bay (*fide* Walker).

Hemerodromia obsoleta Loew.

Cent., ii, 52.

Whitish, subfuscous above, margin of thorax and metanotum black. Wings hyaline. Discal cell oblong, quadrangular, second posterior cell a little shorter than its petiole. Stigma very faint, sublutescent. Legs whitish, last two tarsal joints black. 3.5 mm.

Illinois (Le Baron).

Hemerodromia palloris Coquillett.

Mantipeza palloris Coq., Proc. Nat. Mus., 1895, 392.

Head black, face, cheeks and lower front yellow, white pollinose. Thorax reddish yellow, marked with two slightly darker vittæ and with a whitish stripe between them; pleuræ reddish yellow; scutellum light yellow; metanotum reddish brown. Abdomen yellow, with a median dorsal indistinct brownish vitta. Legs, halteres, antennæ, proboscis and palpi yellow. Wings hyaline. 4-5 mm.

New Hampshire.

ARDOPTERA Macquart.

Small, slender, almost bristleless flies. Head depressed, oval, the lower part carried in front. Antennæ short, the third joint oval, compressed, the terminal style very long. Proboscis short and thick, directed forwards. Legs slender, long; the fore coxæ shorter than the femora. Wings long and narrow, with numerous small white spots in the following species; the second and third veins undulating, the third vein forked, sometimes a cross-vein connects the second vein with the anterior branch of the third vein; discal cell long, emitting three veins to the wing margin; basal and anal cells small, separately closed, the anal cell a little longer than the second basal; anal angle poorly developed.

Ardoptera irrorata Fallen.

Fallen, Empid., 13, 17.

Meigen, Syst. Beschr., iii, 66, etc.

Black, legs ferruginous. Palpi small, white. Antennæ black. Front black, margined with glistening white. Thorax cylindrical, black, as long as the abdomen, with a median white irridescent vitta. Abdomen black. Halteres white. Wings brown, with scattered white dots. 2.5 mm.

Europe and North America (Loew).

RŒDERIODES Coquillett.

Face bare, not separated from the cheeks by a groove; cheeks two-thirds as broad as the eye height; proboscis nearly as long as the height of the head, rigid, the labella not developed; third joint of the antennæ oval, pointed at the apex, the apical style about as long as the remainder of the antenna; no acrostichal bristles, scutellum bearing bristly hairs in addition to the two marginal bristles; wings destitute of a brown stigmal spot, third vein forked, discal cell complete, sending two veins to the wing margin, of which the upper vein is forked, hind cross-vein very oblique, vein at apex of the anal cell nearly perpendicular, sixth vein not prolonged beyond apex of the anal cell; legs slender, destitute of bristles and of long hairs, pulvilli and empodia well developed.

Rœderiodes juncta Coquillett.

Bull. New York State Mus., 1901, No. 47, p. 586.

Black, the coxæ and femora yellow, tibiæ and tarsi brown; head whitish pruinose, the front and upper part of the occiput grayish black; thorax opaque; mesonotum grayish black pruinose, an elongated spot in front of the scutellum, and the pleura whitish pruinose; five pairs of dorso-central bristles; scutellum, except its extreme base, gray pruinose, abdomen opaque, almost velvety; wings grayish hyaline, unmarked. 2.5 mm.

New York (Needham).

The very poorly described *Hemerodromia albipes* Walker may possibly be this species.

CLINOCERA Meigen.

Small, slender, almost glabrous species of gray, olivaceous, or piceous color. Antennæ three-jointed, short, the third joint oval, with a short, outward-pointing bristle. Proboscis thick, short. Eyes of both sexes separated, not or but little emarginate at the antennæ. Thorax elongate, abdomen long and narrow; hypopygium small. Legs long and slender; fore coxæ shorter than the femora. Venation not uniform, the third vein always forked, sometimes a cross-vein present in the first submarginal cell; discal cell sometimes pointed at the tip, sending three veins to the margin, if two, then the first is forked near its base; anal angle not well developed.

Mik's division of *Clinocera** into ten genera is not followed in this paper, as the characters chosen by him from the European species do not seem to be sufficiently correlated in the American forms to justify the adoption of certain of his genera.

Legs including the knees black .... 2.
At least the knees reddish .... 7.
2. Discal cell very oblique apically .... 3.
Discal cell moderately broad toward the tip .... 5.
3. Second and third veins united by a cross-vein, wings spotted. **conjuncta** Loew.
Second and third veins free, wings not spotted, anal vein wanting .... 4.
4. Second submarginal cell short .... **simplex** Loew.
Second submarginal cell long .... **lepida** sp. nov.
5. Stigma obsolete, discal cell very long and narrow .. **dolicheretma** sp. nov.
Stigma distinct, wings with well-developed spots, discal cell short .... 6.
6. Knob of the halteres reddish, second and third veins united by a cross-vein. **taos** sp. nov.
Halteres black, only two submarginal cells present .... **lecta** sp. nov.
7. Wings uniformly subfuscous, with no darker spots .... 8.
Wings cinereous or hyaline .... 9.
8. Thoracic dorsum evenly opaque .... **fuscipennis** Loew.
Thorax with three intervittal spaces shining, veins undulating. **lineata** Loew.
9. Legs black, only the knees reddish, lower part of the face silvery pollinose. **binotata** Loew.
Legs almost altogether testaceous, front black .... 10.
10. Wings hyaline .... **maculipes** Bigot.
Wings spotted with fuscous .... **maculata** Loew.

Clinocera simplex Loew.

Cent., ii, 49.

(?) *Heliodromia longipes* Walker, List., etc., iii, p. 504.

Olivaceo-cinereous, opaque. Head black, white pollinose, the frontal vitta and

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Verhandl. d. k. k. zool. bot. Ges., Band xxxi, 1881, p. 320.

a large occipital spot greenish. Antennæ black. Cheeks broad. Palpi black. Thorax olivaceous, slightly grayish, scutellum, metanotum and pleuræ white-pollinose. Abdomen grayish, with an olivaceous tinge, venter white-pollinose. Hypopygium of the male reflexed, of the same color as the abdomen. Legs slender, black, with short black pile, no apical hairs on the femora, empodium equal to the pulvilli. Halteres piceous, the base paler. Wings cinereous, the stigma obsolete, long, very pale, subfuscous, the first two veins fuscous, the others black, costal setulæ very small, the second longitudinal vein straight, the second submarginal cell short, apex of the discal cell sharp, the second posterior cell cuneiform, no sixth vein. Length 4.3 mm.

Hudson Bay Territory.

It is possible that Walker's *Heliodromia* is Loew's species. The short description of *longipes* agrees very well with that of *simplex*, but in the absence of specimens it would be premature to change the synonymy.

Clinocera lepida sp. nov.

Length 3.5 mm.—Black, covered with dull dark olivaceous pollen on the upper surface and on the legs, and with whitish but not silvery pollen elsewhere, *i. e.*, on the lower part of the face, the cheeks, the pleuræ and the venter. Eyes small, unemarginate, not dividing the large cheeks from the face. Proboscis short, fleshy, black, palpi black. Antennæ distinctly three-jointed, black, the joints subequal, the third joint ovate, arista not longer than the antenna. Acrostichals not developed. Scutellum with only two bristles. Coxæ with a few pale hairs apically. Legs slender, black, front femora a little thickened and with a row of minute fine hairs beneath vanishing apically, sides of the femora devoid of long apical bristles, empodium prominent, golden yellow, larger than the claws or the pulvilli. Halteres wholly black. Wings hyaline, lightly cinereous, unspotted, rather broad, veins black, the third vein thickest, second submarginal cell long; the base of the second submarginal cell, the base of the second posterior, and the apex of the discal cell have almost the same angulation; second basal and anal cells of nearly equal extent apically, anal vein wanting; costal setulæ very minute.

One female; Juliaetta, Idaho (Prof. J. M. Aldrich).

This species agrees with *Chamædipsia* Mik, except for the lack of the characteristic thoracic bristles. From *Clinocera* (sen. strict.) it differs in that the larger cheeks are not constricted off from the clypeus. Both of these characters received much stress from Mr. Mik.

Clinocera dolicheretma sp. nov.

Length 4-5 mm.—Black, coated with olivaceous above and cinereous beneath. Face wholly white dusted. Antennæ very short, black, the joints minute, the arista four times the length of the third joint. Clypeus reaching below the eye, but distinctly separated from the cheeks. Palpi and proboscis black. Occipital bristles dense, scattered over the vertex, the lower cilia prominent. No acrostichal nor intermediate dorso-central bristles; scutellum with two minute bristles besides the two moderately large marginal ones. Mesonotum with traces of two black vittæ; pleuræ, pectus and coxæ coated with white dust, coxal and metapleural bunch of hairs yellow, prominent. Abdomen cinereous, olivaceous brown above; hypopygium small, slender, completely reflexed, the terminal heel robust. Legs slender, black, the femora black-spinose beneath apically, of the male the front femora have the lower surface provided with pale cilia near the base, no long bristles present; the male front tibiæ are provided with a double row of hairs on the under surface, the front row short, spine-like, the hind row consisting of fine and long hairs; pulvilli minute, empodium as long as the claws. Wings long, slender, hyaline, with a faint infumation, the stigma faint, narrow; veins black, the third vein strongest, the second submarginal cell long, narrow; discal cell very long, not pointed, the first section of its anterior border nearly two-thirds the length of the second section and twice as long as the vein between the second basal and discal cells, the posterior border three times the length of the outward continuation of that vein; anal and second basal cells separately closed, of equal extent, anal vein evanescent.

Numerous specimens. Juliaetta, Idaho (Prof. J. A. Aldrich).

This species apparently belongs to the division *Rœderia* Mik.

Clinocera conjuncta Loew.

Wien. Ent. Monatschr., iv, 80.

Olivaceous, thorax with two black vittæ, pleuræ and coxæ white-pollinose, legs wholly black. Wings fusco-maculate; an obsolete spot between the third and fourth veins behind the cross-vein, a second ascending from the third vein to the fusco-cinereous stigma, a third uniting the basal part of the anterior branch of the third vein with the cross-vein which connects it with the second, a fourth including the veins which close the small and apically very oblique discal cell, a fifth present on the last segment of the fourth vein. Halteres dull yellowish. 4.5 mm.

Washington, D. C. (Osten Sacken).

Clinocera taos sp. nov.

Length 3 mm.—Black, occiput and sides of the mesonotum closely dull dark olivaceous pollinose. Face bare, narrow below the antennæ, the lower part white-pollinose, constricted from the small cheeks. Antennæ short, the basal joints short, the arista a little longer than the antenna. Proboscis and the palpi black. Occiput and pleuræ olivaceous, becoming cinereous on the coxæ, middle of the mesonotum, scutellum, metanotum and abdomen. No acrostichals nor intermediate bristles among the dorso-centrals; scutellum with only two bristles. Legs slender, coxæ with short sparse golden-yellow hairs bunched together apically; no long lateral apical femoral bristles; empodium, pulvilli and claws subequal, minute. Knob of the halteres reddish. Wings moderate, infumated, with three more or less interrupted darker cross-bands, the first including the anterior cross-vein, another somewhat proximal to the posterior cross-vein, the third passing through the abrupt base of the second submarginal cell; veins with a feeble trace of undulation, the anterior branch of the third vein connected with the second vein; discal cell moderately broad, the first section of its anterior border one-half the length of the second section, the hind border one-third longer than the outward continuation of that vein; anal and second basal cells outwardly nearly flat, closed together, oblique, anal vein indistinct; no costal setulæ.

One female; Franconia, New Hampshire. This species belongs to Mik's resurrected genus *Heliodromia* Haliday.

Clinocera lecta sp. nov.

Length 3 mm.—Black, coated above with dull dark brown pollen becoming cinereous on the face, lower occiput, pectus, pleuræ, coxæ, lateral spot of the mesonotum, metanotum, abdomen, knob of the halteres, and the under side of the front femora. Antennæ short, black, the first two joints minute, arista subequal to the antenna. Eyes large, separating the naked face from the cheeks. Proboscis and palpi black. Occipital bristles short, arranged in a semi-circular marginal row. Mesonotum with two opaque black vittæ, nowhere shining, no achrostichals, the dorsi-centrals without intermediate bristles; scutellum with only two long hairs. Hypopygium recurved, the lower portion produced as a strong heel. Legs slender, black, front femora of the male with minute bristles beneath, and with a small apical fringe of minute hairs on the front side; empodium longer than the claws or pulvilli. Wings hyaline, with three faint spots, the first round, centering about the anterior cross-vein, the second elliptical, passing through the posterior cross-vein and extending from the marginal to the fourth posterior cells, the third spot circular, centering about the base of the second submarginal cell; stigma well-developed, elongate, elliptical; the centers of the cells purer hyaline than the margins; base of the second submarginal cell abrupt, and with a short adventitious spur extending into the first submarginal in the males; second posterior cell broad at the base; discal cell moderately broad and rather long, the first section of its anterior border one-fourth the length of the second section and equal to the externo-anterior edge of the second basal cell; anal and second basal cells closed together, their outward boundary oblique, anal vein imperfect; costal setulæ inconspicuous, very minute. Halteres black.

Two males and one female; Kendrick and Lewiston, Idaho (Prof. J. M. Aldrich).

This species belongs to *Phæobalia* Mik.

Clinocera binotata Loew.

Zeitschr. f. ges. Naturw., 1876, p. 325.

Olivaceous, front and upper half of face black, lower half of face white-pollinose, dorsum of thorax with two narrow black vittæ, abbreviated behind; legs black, apex of all the femora rufescent, anterior femora thicker towards the base, and bearing a few longer hairs below; wings subcinerous, the anterior branch of the third longitudinal vein lined with black near its base, also the adventitious vein by which it is connected with the second longitudinal, and the posterior cross-vein bordered with black. 3 mm.

New York (Osten Sacken).

Two females from Montreal, Quebec, belong to this species. The two scutellar bristles are very long. The face is constricted from the cheeks, but the clypeus extends below the eyes. The rufescence at the knees is not conspicuously well marked. Halteres black. Discal cell blunt. This is a *Clinocera* in Mik's sense.

Clinocera maculata Loew.

Wien. Ent. Monatschr. iv, 79.

Olivaceous, thorax obsoletely bilineate, pleuræ and coxæ white-pruinose, venter glaucous; femora and tibiæ testaceous, tarsi black. The anterior branch of the third vein is marked with a fuscous spot at its base, ascending to the apex of the second vein, and with another smaller spot at its apex. Halteres black. 3 mm.

Washington, D. C. (Osten Sacken).

Clinocera lineata Loew (Figs. 61, 62).

Cent., ii, 50.

Black, dusted with olivaceous green above, subopaque. Antennæ black, very short; cheeks moderate, together with the face white-pollinose; palpi black. Two shining vittæ on the thoracic dorsum, separated by a black line, and margined outwardly by a black vitta. Scutellum of the same color as the thorax; the lower half of the pleuræ covered with white pollen. Abdomen somewhat shining. Legs slender, almost bare, the base of the coxæ often, the knees, the very apex of the tibiæ and the last joint of the tarsi always fuscous; no setulæ present at the apex of the femora; empodium minute, equal to the pulvilli; claws minute. Halteres dark fuscous. Wings lightly infumated, the veins dark brown, no costal setulæ; the second longitudinal vein sends a cross-vein to the costa of the wing before its end; the third longitudinal vein undulating, the anterior branch reaching forward more than in the other species; a clear spot present in the very apex of the discal cell. 2.3 mm.

Pennsylvania (Osten Sacken). Three specimens from Seattle, Washington, notwithstanding their distant locality, I take to belong to this species.

The postocular bristles are regularly arranged in an interrupted semicircular row of about fifteen in number, and are not supplanted by pale cilia beneath. The two outer vittæ of the thorax bear the dorsal bristles. The cross-vein in the marginal cell is wanting in these western specimens, but its place is indicated by a sharp upward bend of the second vein; but a trace of the anal vein is left.

There is much greater resemblance between *Clinocera appendiculata* Zetterstedt (European) and *Clinccera* (*Rœderia*) *dolicheretma* than between *Clinocera binotata* Loew and *lineata* Loew, yet the former two are generally different, while the latter fall together according to Mr. Mik's arrangement.

Clinocera lineata is intermediate between the other species and the genus *Ardoptera,* as is seen from its venation, but is more closely related with the Clinoceras on account of the conformation of the mouth and the shape of the head.

Clinocera fuscipennis Loew.

Zeitschr. f. ges. Naturw., 1876, p. 324.

Piceous, front and face concolorous, dorsum of thorax not vittate, legs fuscous, wings wholly, uniformly subfuscous, stigma scarcely darker, costa free from setulæ, second submarginal cell narrower than the end of the first, last section of the fourth vein exceeding by a little the length of the discal cell. 2.5 mm.

New Hampshire (Osten Sacken).

Clinocera maculipes Bigot.

Bull. de la Société Zool. de France, 1887. p. 118

Black; antennæ, halteres and legs pale yellowish; front black; femora spotted with pale fuscous on the underside near the tip; tarsi narrow, black apically; wings hyaline. 2 mm.

California.

HYBOTINÆ.

HYBOS Fabricius.

Small, slender, almost glabrous species, of generally shining black color. Antennæ short, apparently two-jointed, the terminal bristle long. Eyes bare, contiguous above in both sexes. Thorax prominent, hunched; abdomen long and slender, curved downward. Hind femora long and thick, bristly beneath. Wings unspotted, variable in color; second vein straight, third vein simple; discal cell longer than the second basal, rounded at tip; anal angle large, rectangular.

In as much as Walker, Bellardi and Loew have each described a different species of *Hybos* as *dimidiatus,* it may be well to revise the names here to avoid further confusion. Therefore Walker's species* from Brazil having priority may remain. Loew's *dimidiatus*† originally described from Cuba may be called *electus;* while the Mexican species of Bellardi ‡ may hereafter be known as *sequens.*

Costa rounded, bearing strong spines .... **spinicosta** Wh. et Mel.
Costa straight. without spines .... 2.
2. Posterior femora strongly toothed beneath, much swollen; wings wholly fuliginous (Brazil).... **Lactistomyia insolita** gen. et sp. nov.
Posterior femora more slender; wings at least in part hyaline............. 3.

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* Walker, Insecta Saundersiana, p. 205, 1856.

† Loew, Wien. Ent. Monatschr., v, 36, 1861.

‡ Saggio Dipt. Mes., ii, 97, 1861.

3. Legs wholly yellow .... **sequens** nom. nov.
   Legs in part dark brown to black .... 4.
4. Halteres yellow .... 5.
   Halteres infuscated .... 7.
5. Wings hyaline .... 6.
   Wings gray, though hyaline at base .... **reversus** Walker.
6. Legs wholly black .... **typicus** Wh. et Mel.
   Tibiæ and tarsi more or less yellow .... **slossonæ** Coquillett.
7. Stigmal spot noticeable .... 8.
   Stigmal spot obsolete .... **triplex** Walker, varieties.
8. Wings completely hyaline .... 9.
   Wings more or less infumated basally .... 10.
9. Tibiæ black .... **mellipes** Wh. et Mel.
   Tibiæ fulvous; size smaller .... **electus** var.
10. Thorax and abdomen with bluish reflections .... **electus** nom. nov.
    Thorax and abdomen black .... **triple~~s~~x** Walker, varieties.

Hybos typicus Wheeler et Melander.

Biol. Cent.-Am. Dipt. Suppl., 1901.

Black cinereous, slender. Antennæ black, short; third joint oval, not longer than the first. Eyes contiguous below antennæ. Proboscis black. Thorax prominent, black, shining through the coating of brown dust; pleuræ cinereous-black. Halteres yellow. Abdomen slender, piceous, slightly pubescent, especially towards apex. Genital apparatus of male small, not giving the abdomen a club-shape, with two projecting filaments. Legs slender, piceous, shining, with scattered pubescence, knees lighter, front tarsi long, metatarsus equal to the tibia, middle tibiæ with two long slender bristles on the external side at basal fourth and half, and three on inner side at half, three-fourths and tip; hind femora not much thickened, not evidently serrate beneath, besides the pubescence a series of about six hairs beneath; hind tarsi not toothed beneath. Wings hyaline, subquadrate, obtusely rounded at apex, anal angle not strong, veins yellowish; third vein terminates beyond the middle, parallel with the fourth; stigmal spot not well developed, not filling out the apex of the marginal cell; discal cell broad; anal vein not evident. The fine hairs around the margin of the wing are not so closely placed as usual. 4.5 mm.

The males have the front legs sparsely ciliate with long hairs; the tibiæ on the posterior side and the metatarsi on both sides.

Guerrero, Mexico (H. H. Smith).

Hybos spinicosta Wheeler et Melander (Fig. 77).

Biol. Cent.-Am., 1901, Dipt. Suppl., p. 374.

Differing from *typicus* as follows:—Face narrower, dusted with silvery-white instead of gray. Legs wholly pitchy-black; the tibial and tarsal bristles are shorter and more numerous. The posterior legs and the abdomen are covered with much shorter hairs; the abdomen not shining, dusted. The hypopygium is terminal and more enlarged. The wings are somewhat infuscated, broader and with peculiar venation; costa bent at tip of first vein, so that the anterior edge of the wing is bowed outwardly, beset with spiny hooks from the junction of the auxiliary vein, these hooks gradually becoming straight at about the middle of the wing and passing insensibly into the usual fringe of hairs; stigmal spot very broad; second vein strongly curved in a double curve to accomodate itself to the deep stigma, ending much nearer to the tip of the first vein than usual; third vein straight, subparallel with the costa in the outer part of its length; discal cell narrow, the cross-vein at its apex perpendicular to the penultimate section of the fifth vein. The halteres seem to have been dark. 4.5 mm.

Guerrero, Mexico (H. H. Smith).

Hybos mellipes Wheeler et Melander (Fig. 78).

Biol. Cent.-Am., 1901, Dipt. Suppl. p. 373

Black, shining, moderately strongly yellow-pilose. The two parts of the antennæ are subequal in length, arista shorter than the eye-height. Eyes contiguous below the antennæ, leaving a small subantennal triangular space shining black. Mesonotum shining black, moderately strongly pilose. Pleuræ black, shining, not ciner~~e~~ascent. Pedicel of halteres black, knobs defective. Abdomen shining black, robust, not unusually hairy. Legs except tarsi shining black, strongly hairy; posterior femora incrassate, not strongly spinulose beneath; first two joints of tarsi yellow, remainder blackened. The hairs of the legs are longer laterally, so as to give the legs, especially the tarsi, a ciliated appearance when viewed from the front. Wings narrow, wholly hyaline, except for the fuscous stigma which completely fills the outer third of the marginal cell; veins strong, discal cell narrow. 4 mm.

Guerrero, Mexico (H. H. Smith).

Except for the usual postoculars the pile is yellowish.

Hybos electus nom. nov.

Hybos dimidiatus Loew (nec Bellardi nec Walker), Wien. Ent. Monatschr., v, 36.

Wholly black, very shining, thorax with a greenish, abdomen with a bluish tinge. Pile of the whole body pale, of the abdomen whitish. Legs black, the apex of the femora, the front and middle tibiæ, and the first two joints of the tarsi yellow, the remaining joints blackish. Some longer setæ present near the apices of the anterior and middle tibiæ, and on the anterior metatarsi. Halteres black. Basal half of the wings blackish, apical cinereo-hyaline, stigma very distinct, oblong, black. 3 mm.

Cuba.

Three specimens from St. Vincent Island show variation in the fuscous legs, hyaline wings and slightly smaller size, though they retain the bluish body color of Loew's typical *dimidiatus*.

From this variety two specimens from St. Vincent, four from Tifton, Georgia, and two from New Bedford, Massachusetts, vary in the blackish body color, but are similar to it in other respects.

The extension of this species to the United States is interesting.

Hybos slossonæ Coquillett.

Proc. Nat. Mus., 1895, p. 437.

Head, including the antennæ, proboscis and palpi, black; face broad, whitish pollinose; proboscis slender, rigid, slightly longer than the height of the head only slightly longer than the palpi. Thorax black, shining, lightly pollinose, the pile rather long, yellowish white; pleuræ black, subshining, lightly pollinose, no long pile in front of halteres; scutellum black, subshining, bearing two long yellowish apical bristles and several shorter ones. Abdomen black, shining, its long pile yellowish white. Coxæ and femora black, apices of front and middle femora yellow; front and middle tibiæ yellow, the hind ones black; tarsi yellow, underside of the first two joints of the hind tarsi beset with small black points, sides of hind metatarsi destitute of long black spines. Knob of halteres yellow. Wings hyaline, the stigma grayish brown. 3–4 mm.

New Hampshire, Massachusetts, Wisconsin; numerous specimens.

Hybos reversus Walker.

List Dipt. Ins., iii, p. 487.

Body black, shining; eyes dark bronze; feelers black; abdomen clothed with long hoary hairs; legs yellow; hips, thighs and hind shanks black; tips of four front thighs yellow; four front shanks tawny towards the base; hind feet and tips of four front feet tawny; wings pale brown, darker along the borders of the veins, colorless at the base; wing-ribs and poisers yellow; veins piceous, yellow towards the base. 4 mm.

Trenton Falls (Walker); Jamesburg, N. J. (C. W. Johnson).

Hybos triplex Walker (Figs. 79, 80, 81).

Hybos purpureus Walker, List Dipt. Ins., iii, p. 486.
Hybos duplex Walker, List., etc., p. 486.
Hybos triplex Walker, List, etc., p. 486.
Hybos subjectus Walker, List, etc., p. 487.
Euhybos Coquillett, Proc. Nat. Mus., 1895, p. 437.

As this genus contains some of the most variable of flies, it is not strange that with the limited material at his disposal Mr. Walker should erect four species on what is now given as a single form. The unusually rich collection of this species shows variations in color to every degree; hence, even the Mexican varieties which are to some extent distinct had better be dropped as varietal names. In establishing these forms it was not the intention to erect mere catalogue names, but to give convenience in handling the collections.

The name *triplex* is chosen, as it has been used more than the others for this species.

The genus *Euhybos* Coquillett, established on Walker's species, has been rejected because its characters are shared in varying part by the Mexican species.

Head: occiput finely dusted, finely pubescent. Eyes brownish, contiguous above and below the antennæ. Antennæ black, third joint oval to subulate, blunt at the tip or gradually passing into the arista. Mouth parts inconspicuous.

Thorax black, shining, with long or short, rather dense to moderate, white to black, or mixed white and black hair. Pleuræ glabrous. Scutellum with two bristles.

Abdomen black, shining, except the hypopygium and the last two segments of the female, with sparse or bushy whitish hairs, denser on the sides of the segments basally. Hypopygium with denser and shorter hairs, small; the valves vary in length, the ventral process may be minute or in the lengthened hypopygium elongate.

Legs wholly black, except the pulvilli, or more or less yellowish, with bristle-like and ordinary, whitish to dusky hairs. Hind femora piceous to shining black, variable in length and thickness, black-spinose below. Front and middle legs slender. Hind tibiæ bowed, without bristles, piceous to black. Front and middle tibiæ piceous to black, with bristles. Knees sometimes yellowish. Metatarsi often yellow. Tarsi variable in amount of yellow color, always dark at the tip, with several long, slender bristles, except on the hind pair.

Wings almost clear hyaline to brown, except the apical third or less. Stigmal spot brown or absent. Halteres fuscous. 2.5-5 mm.

This description of an insect which may well share with the beetle *Nodonta* (*Colaspis*) *tristis*, the distinction of being the most protean of insects, is drawn from an examination of over a hundred specimens. These flies were collected throughout the eastern half of North America. The localities represented are Massachusetts, Pennsylvania, Maryland, North Carolina, Georgia, Alabama, Ohio, Ontario, Michigan, Indiana, Illinois, Wisconsin, Colorado, Texas, Vera Cruz, Tabasco and Yucatan.

Hybos sequens nom. nov.

Hybos dimidiata Bellardi, Mem. della Reale Acad. delle Scienze di Torino, Ser. ii, vol. xxi, p. 197.

Female.—Brownish black. Head moderate; antennæ black; proboscis yellow; occiput black. Thorax strongly convex, brownish black, with dense and short fuscous tomentum; humeri pale; pleuræ and pectus pale fuscous; scutellum brownish black, concolorous with the thorax; halteres pale at the base, subfuscous apically. Abdomen brownish black, side margins pale; venter black, pale at the sides; ovipositor long, acute, black. Legs honey-yellow, with black spines; posterior femora much thickened, long. Wings strongly fuscous at base, apically subhyaline; first posterior cell much narrowed at the margin of the wing; stigma elongate, fuscous. 5 mm.

Mexico (Salle).

Among the Empidæ to be worked over for the Biologia Centrali Americana of Messrs. Godman and Salvin were two species, both undescribed, taken in Chapada, Brazil. One of these, the subject of this note, is a peculiar Hybotine, which can not be classed with any of the known genera. This fly, though clearly belonging to the subfamily Hybotinæ, presents a habitus much different from that of any of the other members of the group. Both in color and structure it departs from its nearest relative *Hybos* Fabricius, from which it may be distinguished by the uniformly brown wings, the narrowed first posterior cell, the greatly thickened legs, the smaller number of bristles, the stouter abdomen, the large hypopygium, etc.

From *Scelo*labis~~*bates*~~ Philippi* this form may be separated by the two-jointed antennæ, longer anal cell, stouter abdomen, shorter and stronger legs, etc.

From *Harpamerus* Bigot† (Ceylon) a close relative apparently; it is generically distinct, in that the spines of the underside of the hind femora arise from the apices of strong tubercles instead of being merely incrassate towards the base. The anal cell seems to be longer, and the whole wing different.

LACTISTOMYIA gen. nov.

Robust; thorax and abdomen densely covered with fine reddish brown tomentum. Antennæ very short, two-jointed, the outer joint elongate-oval, slightly longer than the inner joint, with a slender terminal bristle over four times the length of the antenna. Proboscis slender, projecting forwards, two thirds the height of the head. Palpi slender, parallel with and shorter than the proboscis. Eyes bare, rufous, contiguous from the antennæ to the three ocelli, the upper half consisting of larger ommatidia than the lower. Postocular bristles minute. Thorax globose, very prominent, with no bristles, but with scattered, fine, reddish pubescence, longer at the sides, and almost bristle-like at the margin of the scutellum. Abdomen robust, cylindrical, deflexed at the tip, twice the length of the thorax, with fine pale hairs along the sides of the segments, longer than those of the thorax. Hypopygium large, deformed, flexed to the right, consisting of a large, very convex, dorsal piece, produced at the right distal corner, and with a marginal fringe of small bristles, and a lengthened, transversely convex, ventral valve, irregularly produced and twisted to the left of the upper projection; between the two arises the thin compressed, semi-translucent, hastate penis. Legs short, robust, front and middle legs simple, though stout, hind legs remarkably thickened, strongly tuberculate and spiny below, and bristly above; hind tibiæ glabrous, bent at proximal fourth and from thence uniformly curved, sharp on inner edge, rounded on the outer, the side faces flat. Middle tibiæ on the outer edge with three bristles; remaining hairs of the legs finer, denser on the front and middle legs, though nowhere long. Wings broad, rather pointed at the tip, anal angle prominent, rounded, almost rectangular; veins strong; first posterior cell much narrowed in the margin; discal cell long and narrow; outer section of the fifth vein equal to the posterior cross vein; outer section of the sixth vein shorter than the anal cross-vein.

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* Verh. d. k. k. zool. bot. Ges., Band xv (1865), p. 751.

† Revue et Mag. de Zool., No. 7 (1859).

Lactistomyia insolita sp. nov. (Fig. 82).

Male.—Length 5.5 mm., length of wing 4.5 mm. Robust, piceous, with a greenish tinge. Antennæ piceous, exceedingly short, the arista a little shorter than the eye height. Palpi and proboscis fuscous; proboscis one-fourth shorter than the head. Eyes narrowly separated on the face. Thorax with golden pubescence and brownish dust. Tegulæ and halteres infuscated, the former with short yellow cilia. Abdomen dark olive green, pilose along the sides, twice the length of the thorax; hypopygium large, reflexed, concolorous, except the lighter metallic, fuscous distal portion, its sutures fringed with hair, the left side with a larger, inverted, the right side with a smaller, bowl-shaped piece. Legs short, stout, fuscous, shining, especially the hind legs, metallic by certain reflections; coxæ concolorous with the legs; anterior and middle femora, tibiæ and tarsi all of about the same length; posterior coxæ globose, swollen on the inner side; posterior femora not surpassing the abdomen in length, enormously thickened, sparsely hairy, on inner side bounding a narrow, smooth, shining space, with two rows of tubercles, about eleven in the anterior row and seven in the posterior, each tubercle provided with a stout spine; hind tibiæ stout, one-third less than the length of the femora, strongly incurved, without spines, but with an external row of short hairs; hind tarsi short, one-half the length of the others, the first joint one-third longer than the remainder of the tarsus. Wings strongly infuscated, of the same general color of the rest of the insect, no darker stigma; rather pointed; veins strong, third and fourth longitudinal veins convergent, ending symmetrically at the tip of the wing; discal cell narrow; anal angle fully developed, anal vein strongest at the tip, though poorly marked.

A single male specimen. Chapada, Brazil. A very curious insect.

SYNECHES Walker.*

Small, generally brownish species. Antennæ shorter than the head, apparently two-jointed, terminal joint rounded with a long end-bristle. Proboscis short, palpi rather long. Eyes bare, contiguous in both sexes. Thorax large, hunchbacked, abdomen long, small at tip. Hind femora long, incrassate, with setulæ beneath. Wings generally spotted, second vein bowed towards the costa, third vein simple, discal cell present, with two veins at its tip; anal cell as long as the second basal, nearly truncate at its tip, anal angle rectangular.

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* Almost the only note on the manner of feeding of American Empididæ is to be found in the Proceedings of the Washington Entomological Society, 1891, p. 146. There Mr. Schwarz describes the feeding habits of a species of *Syneches*:

Wings unspotted, or marked with only one spot..............................2.
Wings with a black spot beyond the apex of the first vein and another at the apex of the second vein; marginal cell at tip of first vein twice as wide as the submarginal cell at that point.......**simplex** Walker.
2. Legs partly or wholly yellowish..........................3.
Legs wholly black, thorax marked with a white pollinose humeral spot, and with a similar one in front of the scutellum; stigma brownish. **albonotatus** Loew.
3. Wings marked with a brown stigmal spot..............................4.
Wings with a pale gray stigmal spot, femora wholly yellow. **hyalinus** Coquillett.
Wings unspotted, knob of halteres and the entire body black. **pusillus** Loew.
4. Marginal cell at apex of first vein twice as wide as the submarginal cell at the same point; knob of halteres whitish..............................5.
Marginal cell not widened..............................6.
5. Thorax wholly yellowish..............................**rufus** Loew.
Thorax marked with three black vittæ, or wholly blackish. **thoracicus** Say.
6. Knob of halteres black..............................**debilis** Coquillett.
Knob of halteres brown........**quadrangularis** Wheeler et Melander.

Syneches albonotatus Loew.

Cent., ii, 18.

Black, opaque, thorax marked with white pollinose shoulder-spots and one before the scutellum. Abdomen with fuscous pollen. Legs black, shining, tarsi piceous, black towards apex. Wings dark cinereous, veins black, stigma subobsolete, pale fuscous. 3.5 mm.

District of Columbia (Osten Sacken).

Syneches hyalinus Coquiilett.

Proc. Nat. Mus., 1895, p. 437.

Opaque, black, base of the abdomen yellowish; antennæ and knob of halteres

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"During daytime these flies rest on the under side of leaves, etc., in the shadiest parts of the woods. Toward evening they fly about in the more open places and capture minute Diptera. Holding their prey between the legs, and their body being in a vertical position, they slowly fly toward the nearest bush, and, without alighting, most dexterously manage to take hold of the edge of a leaf with the claws of a front leg. Thus vertically suspended by a single leg, the fly uses its five free legs for manipulating the gnat. Within ten seconds it has sucked out its prey, then drops the same and flies away."

yellowish brown; proboscis and legs yellow; coxæ, trochanters and tips of tarsi black; wings hyaline; stigma pale grayish; marginal cell at tip of first vein nearly twice as wide as the submarginal cell at that point. 5 mm.

Maryland (Coquillett).

Syneches pusillus Loew.

Cent., i, 25.

Small, opaque, dark fuscous. Proboscis yellow. Antennæ dark fuscous. Abdomen black, opaque, posterior margins of the segments narrowly cinereous pollinose. Legs pale yellow, varied with fuscous, in the lighter specimens the basal half of all the femora, the apex of the posterior femora, a subapical ring on the posterior tibiæ, a middle ring and the last joint of the posterior tarsi fuscous in color; in the darker specimens these markings are more diffused and nearly black. Halteres dark fuscous, the pedicel lighter. Wings cinerascent immaculate.

Illinois; New York: St. Vincent, W. I.; Wisconsin; Kansas; New Mexico.

Syneches debilis Coquillett.

Proc. Nat. Mus., 1895, p. 436.

Antennæ black, proboscis and palpi yellow. Thorax yellow, marked with three vittæ and a lateral spot of yellowish brown. Abdomen and knob of halteres black. Legs yellow, the last tarsal joints, apices of hind femora, middle of hind tibiæ and of their first tarsal joints black. Wings grayish hyaline, stigma pale smoky brown, marginal cell at tip of first vein not wider than the submarginal cell at the same point. 3.5 mm.

District of Columbia; Maryland: Georgia.

Syneches quadrangularis Wheeler et Melander (Fig. 85).

Biol. Cent. Am., 1901, Dipt. Suppl., p. 374.

Fuscous. Antennæ fuscous. Mouth parts yellowish. Mesonotum fuscous, with faint indications of the lighter vittæ, slightly tomentose. Halteres fuscous, the pedicel lighter. Abdomen dark drown; hypopygium small. Legs, including coxæ, yellow; of the hind pair the femora, tibiæ and metatarsi are apically brown. Wings hyaline, with a single, well-limited, quadrate, dark brown stigmal spot at the apex of the first longitudinal vein; marginal cell not widened at the stigma; third vein not rigidly straight, veins brown. 2.5 mm.

Tabasco, Mexico.

Syneches rufus Loew.

Cent., i, 24.

Rufous, opaque; antennæ, proboscis, palpi, halteres and legs concolorous; the posterior tibiæ often and the anterior and posterior femora sometimes fuscous. Color of the abdomen tending towards fuscous. Wings subhyaline, costal cell lutescent. second longitudinal vein meets the costa obliquely; beyond the end of the first vein there is a black rounded spot. 4 mm.

Illinois; New York: Ohio; Indiana; Wisconsin.

Syneches thoracicus Say (Fig. 84).

Hybos thoracicus Say, Compl. Writ., ii, p. 68.

Antennæ and rostrum yellow, pale; thorax ferruginous, with three dilated black lines; wings obscure, a dark red-brown stigma; feet reddish brown, the posterior pair darker than the others, tarsi yellowish; abdomen dull piceous. Rather more than one-fifth of an inch.

Pennsylvania, Maryland, Virginia, North Carolina, Kentucky, Ohio, Illinois, Kansas.

Syneches simplex Walker (Fig. 86).

Insecta Saundersiana. Dipt., p. 165.

Body dark brown, clothed with black hairs; eyes red, meeting above; facets large; mouth and feelers tawny; bristles of the feelers black; chest adorned with tawny stripes which are nearly confluent; abdomen linear, rather flat, black, longer and much narrower than the chest; tip dark tawny, shining; legs tawny; thighs and fore shanks partly pitchy; wings pale gray, brownish on the borders of the cross-veins and beneath the brand, which is dark brown; the wing is yellow on each side of the latter, and there is a dark brown spot beyond it; wing-ribs and veins brown; poisers large, tawny. 3 mm.

"United States."

Massachusetts, North Carolina, Georgia, Ohio, Ontario, Michigan, Indiana, Illinois, Wisconsin.

SYNDYAS Loew.

Small black species, differing from *Syneches* and *Hybos* in that the first section of the fourth vein is almost indistinct, and that the origin of the second vein is still more distant from the base of the wing.

Only the following species are known from North America.

Dorsum of abdomen opaque.................................**dorsalis** Loew.
Abdomen bronzed black.......................................**polita** Loew.

Syndyas dorsalis Loew.

Cent., i, 26.

Wholly black, shining, the back of the abdomen opaque, clothed with fuscous tomentum. Thorax with very short hairs, abdomen with longer whitish hairs; bristles of thorax and scutellum black. Legs black-pilose, posterior tibiæ thick, clavate, and posterior metatarsi strongly incrassate. Halteres black. Wings hyaline, veins pale fuscous, second half of the costa blackish. 3.3 mm.

New York: Illinois.

Syndyas polita Loew (Fig. 83).

Cent., i, 27.

Wholly black, shining. Dorsum of thorax with very short pile, abdomen with longer, dirty white pile; thoracic and scutellar bristles black. Legs black-pilose, posterior tibiæ thick, moderately clavate, posterior metatarsi moderately incrassate. Wings hyaline, subcinerascent, the outer half of the marginal cell distinctly cinerascent, veins dark fuscous, apical part of the costa black. 3.3 mm.

Carolina: Massachusetts, Georgia, Alabama, Louisiana, Kansas, Ohio, Michigan.

MEGHYPERUS Loew.

Small black species. Antennæ short, apparently two-jointed. Bristle terminal, thickly pubescent. Proboscis very short. Eyes bare, males holoptic, females broadly dichoptic. Thorax large. Legs rather short, wholly glabrous, hind tibiæ somewhat broadened, metatarsi of all the legs lengthened. Wings unspotted, third vein simple, fourth vein forked; discal cell present, with two apical veins.

Third antennal joint twice as long as broad; abdomen shining.
nitidus sp. nov.

Third antennal joint but little longer than wide; abdomen opaque, velvety black.
occidens Coquillett.

Meghyperus occidens Coquillett.

Proc. Nat. Mus., 1895, p. 435.

Black, including antennæ, proboscis, palpi, halteres and legs; third antennal joint conical, slightly longer than wide, the arista two-thirds the length of the third joint. Thorax lightly gray pollinose; scutellum with six black bristles. Abdomen opaque velvet black; hypopygium small, porrect, slightly longer than the seventh segment. Legs rather robust; upper side of the hind femora with a fringe of white hairs, hind femora somewhat broader than any of the others, hind tibiæ greatly dilated; hind metatarsi nearly twice as thick as any of the others. Wings hyaline, stigma and veins brown, anal cell nearly as long as the second basal. 2–3 mm.

Southern California.

Meghyperus nitidus sp. nov. (Fig. 72, 73).

Length 2.5 mm.—Black over all, shining. Eyes of the male contiguous, of the female widely distant. Vertex of the female shining. Antennæ stout, third joint triangular, twice as long as broad, its arista equal to the greatest width of the joint, stout. Proboscis directed forward in the male specimen, downward in the females, nearly as long as the head-height. Thorax with pale yellow bristles, the acrostichals and dorsal rows distinct, scutellum with six pale bristles. Thorax lightly dusted on pleuræ and coxæ. Abdomen shining above and below, with scattered pale hairs. Legs with short pale hairs, but with no bristles, front femora moderately stout, the other femora less thickened; hind tibiæ gradually clavate, compressed; metatarsi about equalling the next three joints, not enlarged. Halteres black, pedicel slender, knob large. Wings clear hyaline, nerves yellowish, an infumated stigmal spot present, anal cell equalling the basals in length, anal angle rectangular.

Three specimens; Moscow, Idaho, June 17, 1895, Prof. J. M. Aldrich collector.

The tips of the abdomen of all three specimens are eaten by parasites, therefore nothing can be stated about the sexual characters.

ŒDALEA Meigen.

Small, slender, almost glabrous species of shining black color. Antennæ long, plainly three jointed, the first two joints short, the third lengthened, with a short, rather stout, two-jointed arista. Proboscis shorter than the head. Eyes of male contiguous, of female separated. Thorax prominent; abdomen long and slender; hypopygium small. Legs slender, except the thickened and lengthened hind femora, which are spiny beneath; the hind tibiæ are bowed, shorter than the femora. Wings with simple third vein; discal cell present, apically with three veins; anal cell (in our species) truncate; anal angle well developed, rectangular.

Oedalea ohioensis sp. nov. (Figs. 74, 75, 76).

Male. Length 3 mm.—Body black, shining. Occiput shining black. Eyes large, brownish red, facets small, eyes contiguous above antennæ. Face shining black, not broad, the sides parallel. Antennæ broken beyond the first joint which is piceous. Proboscis fusco-piceous, haustellate, equalling one-third the eye height; palpi not visible in this specimen. Thorax large, very shining, sparsely covered with pale short hairs, no bristles, except two small preal~~e~~ar and six piceous scutellar ones. Abdomen less shining, cylindrical, slender, a little longer than the head and thorax together, sparsely covered with short dusky hairs; hypopygium small, pointed, with a short thick dorsal process which is bent to the right. Coxæ, front and middle legs and hind femora pale testaceous, the hind tibiæ, except basal fourth, piceous; hind tarsi fuscous; front and middle legs plain, slender, hind femora thickened, reaching to the end of the abdomen, provided with a fringe of long pale hairs, beneath on the outer half with a double row of small black teeth; hind tibiæ two-thirds the length of the femur, at basal fourth geniculate. Halteres pale fuscous. Wings lightly infumated, stigma dark, all the discoidal veins reaching the margin, veins strong, dark fuscous, except the vein between the two basals, anal cross-vein perpendicular to the anal vein which is attenuate, but reaches the margin, anal cell shorter than the second basal cell, anal angle well developed, rectangular.

A single male, collected at Vinton, Ohio, by Prof. James Hine in the early part of June, 1900. This is the first reported occurrence of this genus upon this continent.

EUTHYNEURA Macquart.

Small, sparsely hairy shining species. Antennæ shorter than the head, in our species apparently two-jointed, the outer joint sublanceolate and with a very short arista. Proboscis in the American species not longer than the head. Eyes of the male contiguous, of the female separated. Thorax large. Legs rather long, the hind metatarsi slightly thickened, hairs of legs short. Third longitudinal vein of the wings simple; discal cell emitting three posterior veins; anal vein (at least in our species) distinct beyond the anal cell.

Notwithstanding the fact that I have at hand no specimens of Mr. Coquillett's species, added to the superficial character of his descriptions, yet, without great hesitation, I have placed his species in this European genus.

Black, the legs largely yellow .... **flavipilosa** Coquillett.
Yellow, a median vitta brown.......................... **crocata** Coquillett.

Euthyneura flavipilosa Coquillett.

Microphorus flavipilosus Coq., Proc. Wash. Acad. Sci., 1900, p. 413.

Male.—Black, the hairs, stems of halteres, femora and tibiæ, yellow, knobs of halteres and the tarsi brown; eyes of male contiguous, third joint of antennæ sublanceolate, only slightly tapering to the apex, over four times as long as the style, proboscis noticeably shorter than height of head, mesonotum highly polished, scutellum bearing about ten marginal bristles, abdomen slightly polished. hairs of legs sparse and rather short, first joint of hind tarsi slightly thicker than that of any of the others; wings hyaline, stigma smoky brown, veins yellowish brown, last section of fifth vein one-fourth as long as the preceding section, sixth vein reaching almost to the wing margin. 2 mm.

British Columbia.

Euthyneura crocata Coquillett.

Microphorus crocatus Coq., Proc. Wash. Acad. Sci., 1900, p. 413.

Female. Yellow, the head and its members, a median vitta on mesonotum. dorsum of abdomen and apices of tarsi dark brown, third joint of antennæ sublanceolate, only slightly tapering to the apex, about twice as long as wide, five times as long as the style; proboscis about as long as height of head; hairs of body sparse and rather short, yellow; mesonotum polished, scutellum bearing about eight bristles, abdomen polished; hairs of legs very short, first joint of hind tarsi slightly thicker than that of any of the other tarsi; wings hyaline, veins yellowish brown, stigma almost obsolete, last section of fifth vein nearly half as long as the preceding section, sixth vein ending a short distance from the wing margin. 2 mm.

Alaska.

LEPTOPEZA Macquart.

Rather small, almost glabrous species of shining black or reddish color, with very slender abdomen. Antennæ shorter than the head, three jointed, the third joint elongate-oval, with a long terminal bristle. Otherwise as in *Ocydromia.* There is indication of a vein arising from the front of the discal cell and extending towards the margin.

Black; wings light brown . ...**flavipes** Meigen.
Wings hyaline..2.

2. Posterior femora brown; antennæ short; hypopygium open. **disparilis** sp. nov.
Femora yellow; antennæ longer; hypopygium comparatively closed. **compta** Coquillett.

Leptopeza flavipes Meigen (Fig. 68).

Syst. Beschr., ii, 353.

Shining black, antennæ piceous, palpi yellow. Legs yellow, with brown tarsi, of the hind legs the coxæ, tips of the femora and the tibiæ brown; halteres yellow. Wings brownish. 4 mm.

Europe and North America.

One male; Dixie's Landing, Virginia. The wings are tinged with brown and the halteres are infuscated. The antennæ are much lengthened. The abdomen is piceous, with the apical margins of the segments black. The hypopygium is devoid of long hairs and is closed, its parts not so distinctly visible.

Leptopeza disparilis sp. nov. (Fig. 69).

Male. Length 4.5 mm.—Shining black. Antennæ black, a little shorter than the arista, third joint elongate, conical; antennæ one-fourth the head-height. Palpi and proboscis blackish brown. Postocular bristles black, cilia whitish. Thorax and abdomen with yellowish hairs and bristles. Hypopygium terminal, its parts distinct, filaments exposed, curved on the right side, straight on the left side, lower cleft shorter than the upper. Hind coxæ brownish, fore and middle coxæ, femora and tibiæ yellow, tarsi dusky from first joint, posterior femora and tibiæ brown, the tibiæ and metatarsi swollen, middle tibiæ with a series of three (four) long bristles on the outer side. Halteres light yellow. Wings hyaline, veins rather strong fuscous, no stigmal darkening.

Five males; California, Idaho.

This species is larger and more robust than the others.

Leptopeza compta Coquillett (Fig. 70).

Proc. Nat. Mus., 1895, p. 435.

Head black, gray pollinose, eyes contiguous; antennæ yellow, third joint elongate oval, twice as long as broad, the arista black and nearly as long as the antenna; proboscis and palpi yellow, proboscis less than one-third as long as the height of the head. Thorax, pleuræ, scutellum and metanotum yellow. Abdomen blackish brown, the first segment, narrow lateral margins and front margin of each segment yellow; venter yellow. Legs slender, light yellow, including the coxæ. Halteres light yellow. Wings grayish hyaline, stigma wanting. 4 mm.

New Hampshire, Massachusetts.

Numerous specimens of both sexes in the collection from Ohio, Tennessee, Illinois, Wisconsin and Idaho. The color varies from completely yellow, except the head and three basal spots on the abdomen black, to completely black, except the venter, coxæ and legs rufous in the female, and venter, hind tibiæ and tarsi black also in the male. There is a complete gradation in specimens from a single locality.

OCYDROMIA Meigen.

Rather small, slender, almost glabrous species of black or reddish color. Antennæ shorter than the head, three jointed, the third joint oval, with an almost terminal, dorsal bristle. Proboscis short; palpi small, bare. Eyes glabrous, contiguous in the male, subcontiguous in the female. Thorax prominent; abdomen lengthened, femora and tibiæ simple. Wings with a simple third vein; a discal cell present, emitting two, and often a rudiment of a third, veins to the wing margin. Anal cell shorter than the second basal. Anal angle oblique, rounded.

Ocydromia glabricula Fallen (Figs. 66, 67).
Ocydromia glabricula Fallen, Empididæ, 33, 42 (1816).
Ocydromia perigrinata Walk., List, etc., iii, 488.

This species, which offers about a half dozen color varieties in Europe, is present in the United States as the following variety, described from ten specimens collected in widely distant localities:

Very shining; black above, more or less reddish below. Mouth parts and antennæ black. Occiput less shining than the thoracic dorsum. Margin of the scutellum, the humeri, pleuræ, coxæ and the ventral incisures of the abdomen more or less reddish. Legs yellowish red, more or less fuscous above, at the apices of the tibiæ and on the tarsi. Halteres fuscous. Wings hyaline, more or less infumated. Veins fuscous, somewhat reddish at the base. Anal vein almost reaching the wing margin, the cross-vein nearly perpendicular to it. Outer anterior bend of the discal cell with the fourth vein faint. Legs hairy, the hairs a little denser on the inner apical third of the male hind tibiæ; scutellum with two apical bristles; dorsum of the thorax almost glabrous; abdomen subglabrous; hypopygium black, small, with a few hairs. 5 mm.

Wisconsin, Wyoming, Vancouver Island. Ten specimens.

BRACHYSTOMA Meigen.

Almost glabrous species of brown-black color. Antennæ three-jointed, diverging. Proboscis shorter than the head, thick, vertical. Eyes of both sexes separated, but approaching beneath the antennæ in the male. Thorax large; abdomen slender, lengthened, in the male the genitalia are somewhat exposed, in the female the abdomen ends in a large, semi-transparent, bladder like, peculiar organ, in the lower side of which the ovipositor is enclosed. Wings with a forked third vein; discal cell present, emitting three veins to the margin; anal cell longer than the second basal; anal angle gone.

Antennæ yellow, third joint brown; abdomen yellow, with dorsal dark spots. **robertsonii** Coquillett.
Antennæ piceous; abdomen dark fuscous.............**occidentalis** sp. nov.

Brachystoma robertsonii Coquillett.

Proc. Nat. Mus., 1895, p. 393.

Head black, gray pollinose; face naked, scarcely half as wide as the front; antennæ yellow, the third joint, except at the base and style, brown; the third joint lanceolate, scarcely twice as long as broad, twice as long as the second; style curved, one-third longer than the third joint; proboscis yellow, palpi whitish. Thorax very shining black; pleura blackish, opaque light gray pollinose; metanotum and scutellum the same, the latter bearing two bristles. Abdomen compressed, shining, yellowish, a large dorsal black spot on each segment; hypopygium large, ascending, each upper lamella produced at the outer angles into a pair of long, erect, cylindrical, brown processes; middle lamellæ very large, each bearing at its tip a rather large curved process, in front of which is a small pilose tubercle, while behind it is a smaller tubercle bearing a few long whitish bristles; the inner side of each lamella bears a long, cylindrical, brown-tipped process; filament slender, arcuate, proceeding from apex of the rather large lower lamella. Legs including the coxæ yellow; front and hind femora slender, the middle nearly twice as thick as the front ones, their upper side thickly beset with very short black spines and with longer black bristles; inner side of middle tibiæ also thickly beset with very short black spines. Halteres yellow. Wings nearly hyaline, stigma wanting, first basal cell slightly longer than the anal, which is a trifle longer than the second basal. 4 mm.

Illinois, Tennessee, Ohio.

Brachystoma occidentalis sp. nov. (Fig. 89).

Male and Female. Length 4 mm.—Head and thorax black, abdomen fuscous. Face extremely narrow, gray (female), obliterated in the male; front moderately narrow, black; vertex and occiput shining. Antennæ equal to head, piceous, third joint subequal to first one, arista white, equalling antenna. Palpi white, proboscis yellow. Thorax shining, humeral callosity more or less fuscous; a prealar but no scutellar long bristles; pleuræ a little dusted with gray; halteres yellowish. Abdomen twice as long as thorax, fusco-piceous; of the female compressed in all the (dried) specimens, but the terminal segment greatly enlarged, balloon-like. The enlargement is sometimes translucent yellow bronzed. Abdomen of the male yellowish at the base, black apically, the hypopygium small, terminal, the upper lamellæ small, elongate, slender, the outer extremity filiform, the middle lamellæ moderate in size, the outer side excised, from the emargination of which arises a slender filiform appendage, the central filament slender, its base moderately thickened, strongly arcuate, and suddenly recurved near the tip. Legs slender, yellow, upper side of four posterior femora, all tibiæ and tarsi brownish; no setulæ present. Wings uniformly lightly infumated, veins fuscous, third vein forked, submarginal cell not closed, basal cells equal, anal cell a little longer, its cross-vein curved, no anal angle.

Numerous specimens; Washington, Idaho (J. M. Aldrich).

BLEPHAROPROCTA Loew.

Insects resembling *Brachystoma* in everything but the noninflation of the abdomen and the neuration of the wing. In this genus the first submarginal cell is squarely cut off by a cross-vein connecting the second and the third longitudinal veins.

The three basal cells subequal..2
Second basal and anal cells long.................. ....**binummus** Loew.
2. Base of anterior tarsi fuscous, of middle tarsi badius.....**serratula** Loew.
Anterior and middle tarsi black ....**nigrimana** Loew.

Blepharoprocta nigrimana Loew.

Cent. ii, 17.

Head black, shining. Antennæ black. Face very narrow, white-pollinose. Proboscis pale yellow. Thorax black, shining, bare, the lower half of the pleuræ white-pollinose. Scutellum and abdomen black; venter yellow. Hypopygium subglobose, black, apically with some erect pile pale yellowish. Coxæ and legs slender, yellowish. Anterior femora below near the apex with small black spines; middle femora not thicker than the others, pure yellow; posterior femora fuscous, except the base and very apex. Anterior tibiæ increasing in yellow color towards the apex. posterior fuscous, pale below near the apex. Anterior tarsi black, posterior dark fuscous, black at tip. Wings cinerascent, narrow, stigma obsolete, hairs of the hind margin not bent back; first submarginal cell closed; the three basal cells subequal. 2.7 mm.

Illinois (Le Baron).

Blepharoprocta binummus Loew (Figs. 91, 92).

Cent. ii, 16.

Head black, shining. First two joints of the antennæ pale yellowish, third joint black, the terminal seta black. Face very narrow, white-pollinose. Proboscis pale yellow. Thorax black, shining, bare, hind angles dark fuscous, lower half of the pleuræ white-pollinose. Scutellum black; abdomen black, shining, bare; venter yellowish; hypopygium globose, black, apically provided with a bundle of pale yellow hairs. Coxæ and legs slender, pale yellow. Anterior femora below near the apex with very small black spines; middle femora a little thicker than the others, curved, below near the base with rather sparse white hairs, behind—before the apex—with very closely-placed hairs; hind femora more slender on the outer half, infuscated. Anterior tibiæ simple, basal half of the middle tibiæ subfuscous, at the apex suddenly thickened and provided with long pale yellowish hairs; posterior tibiæ curved, fuscous, the extreme apex paler. The first three joints of the front tarsi decreasing in length, yellow, the last two black, dilated, on both sides short black-pilose, each with a silvery dot below, the outer one larger; of the middle tarsi the first three joints are yellow, the last two black; the hind tarsi have the last joint black, the next to the last dark fuscous, and the others yellow. Halteres white. Wings long, narrow, wedge-shaped, subcinerascent, stigma obsolete, posterior margin with long reflexed hairs in part; first submarginal cell closed; the two anterior basal cells much shorter than the anal. 3 mm.

District of Columbia.

Blepharoprocta serratula Loew (Fig. 90).

Cent. i, 23.

Female.—Head black, shining. Face very narrow, white-pollinose. Proboscis yellow. Thorax and scutellum black, shining, pleuræ sparsely white-pollinose. Abdomen lengthened, cylindrical, dark dull yellow, base and apex darker; venter luteous; last abdominal segment whole, not inflated, the upper and lower parts connate, the posterior margin provided with numerous white hairs. Coxæ and legs pale yellow, an anterior spot on the posterior femora, and almost the whole of the hind tarsi badious, last two joints of the tarsi piceous, the preceding joints of the anterior tarsi fuscous, of the middle badious; posterior femora unarmed, front femora near the tip below with very small spines. Halteres yellow. Wings very narrow towards the base, yellowish cinerascent, veins strong, yellowish fuscous; first submarginal cell closed. 3.3 mm.

Georgia (Gerhard).

EMPIDINÆ.

HILARA Meigen.

Rather large to small species of gray, black, or rarely reddish color. Antennæ as long as the head or longer, three-jointed, the third joint fusiform, compressed, with a two-jointed arista. Proboscis not longer than the head. Eyes of both sexes separated. Humeri prominent. Legs bare or bristly, the front metatarsi of the male nearly always much thickened. Wings with a forked third vein, the upper branch of which is not perpendicular to the remainder; discal cell with three veins issuing from its apex; anal cell shorter than the second basal, both bounded by a cross vein almost parallel with the hind margin; anal angle prominent.

The following artificial key contains all the species from North America, with the exception of Walker's three. In the collection are representatives of about a half dozen other species, but as most of them are species of poor characterization, it was deemed best to await more material.

Thorax green .... **viridis** Coquillett.
Thorax reddish yellow .... 2.
Thorax black or gray .... 3.
2. Tarsi wholly brown, pile on inner side of middle tibiæ long. **testacea** Loew. ✓
Tarsi brown only at apex, elsewhere yellow, pile of inner side of middle tibiæ short .... **lutea** Loew. ✓
3. Front femora thickened; stigma weak .... **femorata** Loew. ✓
Front femora not thickened .... 4.
4. Thorax posteriorly with golden pubescence .... **aurata** Coquillett.
Thorax otherwise .... 5.
5. Antennæ reddish at base .... **umbrosa** Loew. ✓
Antennæ black .... 6.

6. Abdomen yellowish at base .... **basalis** Loew.
Abdomen unicolorous, dark .... 7.
7. Stigma obsolete .... 8.
Stigma at least fuscous .... 12.
8. Legs fuscous to black .... 9.
Legs paler .... 11.
9. Thorax 4-vittate .... **quadrivittata** Meigen.
Thorax evittate .... 10.
10. Thoracic hairs blackish; halteres whitish; veins pale .. **leucoptera** Loew. ✓
Thoracic hairs pale; halteres infuscated; veins dark .... **bella** sp. nov.
11. Abdomen opaque .... **macroptera** Loew.
Abdomen shining .... **congregaria** sp. nov. ✓
12. Front metatarsi not thickened; antennæ at least three times as long as the head, its style twisted .... **johnsoni** Coquillett. ✓
Male front metatarsi somewhat thickened; antennæ shorter, the style straight .... 13.
13. Palpi black .... 14.
Palpi testaceous .... 23.
14. Knees more or less yellowish .... 15.
Knees black .... 18.
15. Wings blackish .... **tristis** Loew. ✓
Wings cinereous .... 16.
16. Knob of halteres black .... **mutabilis** Loew.
Knob of halteres fuscous .... 17.
17. Thorax vittate .... **trivittata** Loew. ✓
Thorax evittate .... **nugax** sp. nov. ✓
18. Thorax vittate .... 19.
Thorax evittate .... 20.
19. Pile of abdomen yellow .... **cana** Coquillett.
Pile of abdomen black .... **baculifer** sp. nov. ✓
20. Abdomen opaque .... **unicolor** Loew.
Abdomen somewhat shining .... 21.
21. Wings dusky .... **velutina** Loew.
Wings subcinereous .... 22.
22. Thorax shining .... **atra** Loew.
Thorax velutinous .... **carbonaria** sp. nov. ✓
23. Abdomen at base fuscous .... **basalis** Loew.
Abdomen wholly black .... 24.
24. Femora, except tip, black; thorax with two obsolete vittæ. **brevipila** Loew.
Femora more or less yellow; thorax evittate .... 25.
25. Knob of halteres black .... 26.
Knob of halteres yellowish .... 27.
26. All the femora testaceous .... **gracilis** Loew. ✓
The hind femora not testaceous .... **nigriventris** Loew.
27. Pile of middle tibiæ long .... **seriata** Loew.
No long hairs on middle legs; second joint of front tarsi of the male not proceeding from the tip of the metatarsus .... **Wheeleri** Melander. ✓

Hilara quadrivittata Meigen.

Syst. Besch., iii, p. 7.

Black, thorax cinereous, with four fuscous vittæ; halteres white; front metatarsi of the male thick, oblong. Head cinereous. The outer thoracic vittæ abbreviated in front. Abdomen and legs black. Wings hyaline, with a brownish margin, at the tip a little darkened. Abdomen of the male piceous, the hypopygium globose, reaching back on the dorsum of the abdomen. Tibiæ bristly. 4 mm.

Europe, Alaska (Kincaid).

Hilara umbrosa Loew.

Cent. ii, 34.

Head black, cinerascent, with whitish pollen, except for the front. The first two joints of the antennæ reddish, fuscous above, the third black. Palpi fusco-testaceous. Dorsum of the thorax subcinerascent, the pollen sparse, closely black-pilose. Abdomen concolorous with the thorax, with short black pile. Coxæ and legs pale testaceous, the posterior tibiæ and all the tarsi dark grayish. Wings cinereous, darker in the outer half, stigma blackish. 4.6 mm.

Illinois (Le Baron).

One male; Wood's Holl, Massachusetts, is probably the same as Loew's species. It is characterized thus:

Vertex opaque black, face cinereous; proboscis as long as the head, labella extending to the tip of the proboscis; palpi directed forwards, fuscous, with long hairs below. Thorax with a few short hairs, serially arranged and parted outwardly from the middle; scutellum with six long and several more short bristles. Hypopygium pedunculate, compressed, black, lamellæ widely opened, filament long, slender, extending forward, entirely visible, apically fuscous. Legs rather stout, luteo-fuscous, tarsi dusky, closely covered with short, dense, dusky hair; the inferior edges of all the femora with short black bristles, each tibia with several long, slender, black bristles on the outer side; coxæ plumose, fore and middle ones anteriorly and hind ones outwardly, with dense black hairs; front metatarsi a little longer than the three following joints, but little thicker than the tip of the tibia. Wings but little darker apically.

Hilara femorata Loew.

Cent. ii, 35.

Head black, opaque, antennæ and palpi black. Thorax and abdomen black, shining, with very short pubescence. Legs black, the knees, apex of the front tibiæ and the front tarsi brown, the posterior tarsi often fuscous, sometimes lighter; the front femora of both sexes much thickened, the male front metatarsi thick. Halteres black. Wings hyaline, the veins fuscous, stigma cinerascent, very faint. 2.6 mm.

Maryland (Osten Sacken), New Jersey, Ohio, Wisconsin.

Hilara velutina Loew.

Cent. ii, 36.

Wholly black. Head velutinous, black-pilose, antennæ and palpi black. Thorax opaque, velvety, black-pilose. Scutellum moderately shining. Abdomen concolorous with the scutellum, black-pilose. Legs wholly black, with short black pile; the anterior metatarsi of the male oblong, incrassate. Wings blackish gray, the stigma dark fuscous.

District of Columbia (Osten Sacken).

Hilara unicolor Loew.

Cent. ii, 37.

Head black, with black pile, the occiput cinereous-black, antennæ and palpi black. the proboscis very short. Thorax cinereous-black, opaque, covered with rather close black pile. Scutellum concolorous with the thorax. Abdomen black-cinereous, opaque, with black pile. Legs wholly black, with short black pile, the hind tibiæ covered with somewhat longer black pile; the front metatarsi (male) thickened. Halteres black. Wings pale cinerascent, stigma black. 3 mm.

Maryland (Osten Sacken), Massachusetts (G. de N. Hough).

Hilara nigriventris Loew.

Cent. ii, 38.

Head black, with black pile, antennæ concolorous, occiput cinereous. Palpi yellowish, fuscous at base. Proboscis almost equal to the head. Thorax black-cinereous, closely black-pilose. Scutellum concolorous with the thorax. Abdomen black, shining, with black pile. Anterior coxæ yellowish, fuscous at base, posterior coxæ generally wholly black, often testaceous at the tip. Legs black, with short black pile, the base and the very tips of the front femora always yellowish, the base of the middle femora less often testaceous; front metatarsi of the male oblong, incrassate. Wings very pale cinerascent, stigma black. 2.6 mm.

Pennsylvania (Osten Sacken).

Hilara trivittata Loew.

Cent. ii, 39.

Subopaque, black-cinereous. Head black, the frontal triangle larger than in the other species, it and the face cinerascent. Antennæ black. Palpi black, subcinerascent. Proboscis a little shorter than the head. Thoracic dorsum opaque, with fusco-cinereous pollen, three almost complete fuscous vittæ present, the black pile very short. Scutellum and pleuræ concolorous. Abdomen subopaque, with fusco-cinereous pollen, clothed with very pale subfuscous pile. Legs black, the pile very short. Wings cinereo-hyaline, stigma dark fuscous. 4.3 mm.

Illinois (Le Baron).

This species is very common in central Texas during the very early part of spring. For an account of its habits see *antea*, p 200.

Hilara mutabilis Loew.

Cent. ii, 40.

Black. Head black, antennæ and palpi black, proboscis a little shorter than the head. Thoracic dorsum clothed with rather long black pile, and covered with cinereous pollen, so that seen from the side it is wholly cinereous, viewed from above it seems marked with three black vittæ, the middle one complete, the side ones much shortened. Scutellum concolorous with the thorax. Abdomen black, almost shining, with sparse black pile. Legs black, with short black pile, the tips of the knees yellow. Halteres black. Wings dark cinereous, stigma black. 2.2 mm.

Illinois (Le Baron).

Hilara brevipila Loew.

Cent. ii, 41.

Black, subopaque. Head black, the occiput cinerascent, with whitish pollen. Antennæ black. Palpi yellowish. Proboscis shorter than the head. Thoracic dorsum subcinerascent, with fine white pollen, with two faint approximated blacker vittæ, and clothed with short blackish pile. Scutellum same color as the thorax. Abdomen black, almost shining, very faintly cinereo-pollinose, black pilose. Legs black, the knees yellowish, the pile short and black, the tibiæ and metatarsi of the front and hind legs provided with a little longer pile above, anterior metatarsi of the male incrassate. Halteres black. Wings hyaline, stigma dark fuscous. 4.2 mm.

Illinois (Le Baron).

Hilara atra Loew. .

Cent. ii, 42.

Black, shining. Head black, black-pilose, antennæ and palpi black; proboscis shorter than the head. Thoracic dorsum black, shining, very slightly cinereous-pruinose, clothed with rather long black pile. Scutellum same color as the thorax. Abdomen black, shining, black-pilose, the somewhat lengthened hypopygium concolorous. Halteres black. Legs wholly black, with short black pile, the front tibiæ and the front metatarsi of the male strongly thickened, bearing rather long pile above. Wings subcinerascent, stigma almost black. 2.2 mm.

Illinois (Le Baron), Massachusetts, Colorado, N. Mex.

Hilara leucoptera Loew.

Cent. ii, 43.

Black, moderately shining. Head black, occiput cinerascent, with whitish pollen. Antennæ black, the first two joints blackish brown. Palpi black. Proboscis a little longer than the head. Dorsum of the thorax subcinerascent, with fine whitish pollen, bearing blackish pile. Scutellum concolorous with the thorax. Abdomen black. Legs fuscous, in mature specimens almost black, knees dirty white. Halteres whitish. Wings hyaline, whitish, anterior veins pale yellowish, remaining veins dull whitish, stigma very weak; anterior branch of the third vein sharply ascending; second submarginal cell very short. 2.5 mm.

Florida (Osten Sacken).

Hilara gracilis Loew.

Cent. ii, 44.

Head black, occiput cinereous. Antennæ black. Palpi yellowish. Proboscis about equal to the head. Thorax cinereous, not vittate, opaque, clothed with black pile. Scutellum the same color as the thorax. Abdomen black, moderately shining, black-pilose, faintly cinereo-pollinose. Legs testaceous or slightly fuscous; tibiæ fuscous, the base of the anterior ones, however, often testaceous;

tarsi dark brown, front metatarsi of the male oblong, incrassate, not provided with longer pile. Halteres black. Wings nearly hyaline, stigma dark brown. 3 mm.

Pennsylvania (Osten Sacken).

Hilara basalis Loew.

Cent. ii, 45.

Black, almost shining. Head black, occiput subcinerascent. Antennæ black. Palpi yellowish. Proboscis shorter than the head. Dorsum of thorax subcinerascent, with very fine whitish pollen, clothed with black pile. Scutellem same color as the thorax. The basal half of the abdomen testaceous or a little fuscous, the apical half black, very faintly cinereous-pollinose. Legs yellowish, tarsi except the base fuscous, the first joint of the fore tarsi of the male strongly thickened; the front tibiæ and the front metatarsi possess somewhat longer blackish pile above. Halteres yellowish brown. Wings gray, stigma dark brown. 3.3 mm.

Illinois (Le Baron).

Hilara macroptera Loew.

Cent. iii, 32.

Dark gray, opaque. Head concolorous, black-pilose. Antennæ black, the first two joints dark brown. Palpi piceous, provided with some longer black hairs. Proboscis black, rather thick, shorter than the head. Dorsum of the thorax not vittate, provided with rather long black pile. Abdomen black, opaque, black-pilose. Legs pale yellow, black-pilose, the outer half of the tibiæ and the whole of the tarsi black; the front metatarsi of the male moderately thickened, and the front tibiæ bearing very long black hair above. Halteres yellowish. Wings very large, distinctly grayish, subhyaline, pale yellowish at the base, veins subfuscous, pale yellow at the base, stigma elongate, cinereous, very faint. 2.7 mm.

District of Columbia (Osten Sachen).

Hilara lutea Loew.

Cent. iii, 33.

Yellow, opaque, clothed with short and sparse black hair. Head blackish cinerascent, with whitish pollen. The basal joints of the antennæ fuscous (the third joint wanting). Palpi yellow; proboscis black, thick, shorter than the head. Pleuræ faintly marked with grayish spots. Abdomen marked with basal blackish fascia on each segment. Legs paler than the rest of the body, the very tip of the tarsi fuscous, and the fore metatarsi of the male incrassate. Halteres pale yellow. Wings almost hyaline, pale grayish yellow, veins yellow, posterior ones subfuscous, second longitudinal recurved towards its apex, the front branch of the third vein obliquely ascending, 2.5 mm.

District of Columbia (Osten Sacken).

Hilara tristis Loew.

Cent. v, 62.

Wholly black, black-pilose, opaque, antennæ, head, hypopygium, halteres and legs concolorous, the pedicel of the halteres and the knees testaceous. Front wholly velvety. Dorsum of the thorax sprinkled with very sparse, pale cinereous pollen, with three darker, almost obsolete vittæ. Legs slender, covered with short pile and a few black hairs, the front metatarsi of the male moderately thickened, oblong, except for the usual hairs, bearing three or four setæ above. Wings blackish, stigma black. 4 mm.

New Hampshire (Osten Sacken).

Hilara seriata Loew.

Cent. v, 63.

Front black, a short vitta ascending from the antennæ more shining. Antennæ black, palpi testaceous. Thorax cinereous opaque, with no vittæ, the pile and the black setæ arranged in regular rows. Scutellum concolorous. Abdomen black, moderately shining, black pilose. Legs together with the coxæ testaceous, the front tibiæ towards the apex, and the hind ones, except the base, fuscous, all the tarsi almost black; the front metatarsi of the male thick, ovate; the middle tibiæ clothed with erect and rather long pile. Halteres testaceous. Wings cinereous, stigma dark gray. 2.5 mm.

New Hampshire (Osten Sacken).

Note.—Very similar to *Hilara gracilis*, but the thoracic pile arranged in regular series and the hairs of the middle tibiæ show a difference.

One specimen from New Jersey seems referable to this species. The stigma is nearly obsolete, however; all the tibiæ are strongly plumose, while the middle metatarsi, as well as the front ones, are thickened. The size is larger than Dr. Loew has indicated.

Hilara testacea Loew.

Cent. v, 64.

Dark yellow, opaque, clothed with black, rather short and sparse hairs. Head black, cinerascent, with whitish pollen. The basal joints of the antennæ dark yellow, the third joint and its style black. Palpi luteous. Abdomen ringed with blackish fasciæ at the base of the individual segments, the fascia often wanting on the first segment. Legs a little lighter than the rest of the body, tarsi wholly fuscous, the apex of the posterior tibiæ often infuscated; front metatarsi of the male thickened; the middle tibiæ provided with long pile below. Halteres yellowish. Wings cinereous, towards the costa yellowish, stigma subfuscous. 2.8 mm.

New Hampshire (Osten Sacken).

Note.—This must not be confounded with *Hilara lutea*, which has less cinereous wings and the middle tibiæ with shorter pile below.

Hilara Johnsoni Coquillett.

Proc. Nat. Mus., 1895, p. 395.

Black; the palpi, halteres, coxæ, femora and tibiæ yellow. Eyes of male separated over twice the width of the lowest ocellus. Head, thorax and scutellum opaque gray pollinose, that on the thorax somewhat yellowish, their short pile and bristles black; scutellum bearing four bristles; abdomen subshining, its pile rather long, black. Wings hyaline, stigma dark brown. Proboscis of male slightly over one-half as long as, in the female fully as long as, the head height. Antennæ of male excessively long, over three times as long as the head, the female antennæ three times as long as the head, the third third joint is much the longest, its style coiled spirally. 4 mm.

Eufaula, Alabama (C. W. Johnson). Numerous specimens.

Hilara cana Coquillett.

Proc. Nat. Mus., 1895, p. 395.

Wholly black, including the palpi and knees. Head opaque gray pollinose, the pile black. First two antennal joints subequal in length, the third three times as long as the second, style nearly as long as the third joint. Proboscis as long as the height of the head. Eyes widely separated. Thorax opaque gray pollinose, marked with three brownish black vittæ, pile and bristles black; pleura naked. Scutellum bearing four black bristles. Abdomen and hypopygium opaque gray pollinose, the pile largely yellowish. Legs bearing rather long scattered pile, none of the femora unusually stout, front tibiæ more robust than the middle ones, front metatarsi greatly enlarged. Wings hyaline, stigma grayish black. In the female the front tibiæ are not thicker than the middle ones, and the front metatarsi are not enlarged. 4 mm.

Southern California (Coquillett).

Hilara viridis Coquillett.

Proc. Nat. Mus., 1895, p. 395.

Shining metallic green, the pleura largely black; antennæ, proboscis, hypopygium and legs yellowish brown; eyes separated the width of the lowest ocellus; proboscis slightly shorter than the height of the head; halteres black; pile and bristles of entire body black; scutellum bearing only two bristles; wings hyaline, veins yellowish, anterior branch of the third vein perpendicular to that vein. 2.5 mm.

Jamaica, West Indies (Cockerell).

Hilara aurata Coquillett.

Proc. Wash. Acad. Sci., 1900, p. 411.

Black, the first two antennal joints and the legs dark brown, the knees and halteres yellow; upper part of the occiput and sides of the front velvet black, middle of front below the lowest ocellus, face, cheeks and lower part of the occiput gray pruinose; eyes of male almost as widely separated as the posterior ocelli, third joint of the antennæ conical, slightly longer than broad, subequal in length to the style, proboscis as long as the height of the head, hairs of palpi and underside of the head whitish, those of the occiput yellowish brown; thorax slightly polished, marked with three, indistinct, black vittæ, almost bare, in the middle, behind the suture, with a golden yellowish pubescence, no hairs in front of the halteres, scutellum bearing four bristles and a few short hairs; abdomen slightly polished, its hairs yellow, hypopygium of male small, nearly bare; legs destitute of long bristly hairs, first joint of front tarsi of the male greatly swollen; wings hyaline, veins yellow, stigma pale yellowish, venation normal. 4 mm.

One female; July, Kukak Bay, Alaska (Kincaid). One male; Eastport, Maine (Nat. Mus.).

Hilara Wheeleri Melander (Fig. 95).

Psyche, 1901, p. 214.

Opaque true black, covered with a very fine gray-glaucous coating. Head, thorax and abdomen with a few pale short hairs in addition to the dark bristles. Antennæ black, short, third joint short, conical, its arista equal to itself. Palpi testaceous, with pale hairs; proboscis piceous, generally less than one-half the head height. Thorax not vittate, its short hairs irregularly, almost serially arranged; scutellum with four black bristles, the inner pair long. Abdomen opaque-black, most often compressed in the male and cylindrical or depressed in the female; no conspicuous bristles, the short sparse pubescence pale; hypopygium not of greater depth than the abdomen, sessile, rarely distinctly separated from the abdomen above, compressed, its lateral valves subglabrous, the dorsal filament thick, but almost always hidden. Legs fuscous to piceous. The males as a rule have the legs darker, but the fore tibiæ are always fuscous. The pubescence is pale yellow; no conspicuous macrochætæ are present, though the hairs of the upper edge of the male fore tibiæ are longer. The middle and hind coxæ are black, the fore coxæ more or less fuscous; tarsi black, the remainder of the legs variable in color, from fuscous to piceous. The front metatarsi of the males enlarged, ovoid, the distal third of the inner side is excised for the reception of the remainder of the tarsus, which thus is not attached to the tip of the metatarsus. The front tibiæ of the males are somewhat thickened. Wings cinereous-hyaline, stigmal spot faintly brown, neuration normal. 3.5 mm.

Wyoming (Wheeler).

In the lot of twenty specimens, one exhibited a peculiar case of tandem hermaphroditism. This specimen has the anterior part of the body formed as in the males, while the posterior portion is female. The reader is referred to the description in Psyche for an account of this case of gynandromorphism.

Species of *Hilara* described by Francis Walker.

Hilara plebeia Walker.

Trans. Ent. Soc. Lond., N. Ser., iv, p. 148.

Black; fore legs ferruginous; wings limpid, veins and stigma black; halteres tawny. 2.5 mm.

United States.

Hilara transfuga Walker.

List of Dipt. Ins., iii., p. 491.

Body black, clothed with short black hairs; eyes, mouth and feelers black; legs piceous, clothed with black hairs; wings dark brown; wing-ribs and veins black; brands black; poisers piceous. 4 mm.

Hudson's Bay. Ten specimens (Kincaid), Alaska; determination by Mr. Coquillett.

Hilara migrata Walker.

List, etc., p. 491.

Body black, hairy; eyes piceous; feelers and lip black, the latter short; legs dark tawny, clothed with short black hairs; wings gray; wing-ribs, veins and poisers piceous; wing-brands brown. 2 mm.

Hudson's Bay.

New species of *Hilara*.

Hilara baculifer sp. nov. (Fig. 96).

Length 3.25 mm.—Gray-black. Head opaque, dirty gray-brown, black-bristly; eyes deeply notched at the antennæ. Antennæ black, somewhat shorter than the head, third joint elongate, lanceolate, with a thickened arista a little shorter than itself. Proboscis black, one-half to two-thirds the height of the head. Palpi black, directed forwards, strongly beset with black hairs below. Thorax dull brownish gray, dorsum with three brown bristly vittæ extending to the scutellum, scutellum with four marginal bristles. Abdomen moderately shining on the upper surface, hypopygium not elongate, its lateral pieces not very shining, a mid-dorsal, anteriorly directed, terminal process present. Legs piceous, moderately shining, with black pubescence and bristles, the anterior tibiæ two-thirds of the length of the femora, moderately incrassate, on outer edge bearing a fringe of long bristles, closely placed near tip; anterior metatarsi greatly lengthened and thickened, in length exceeding the femora, with no long bristles, remaining tarsal joints short and thick. Wings evenly infumated, stigma a little darker, veins brown, strong.

The halteres are broken from all the specimens.

Thirty-two specimens; Tifton, Georgia, 1896.

This species is very distinct in the structure of the front pair of legs.

Hilara bella sp. nov. (Fig. 94).

Male. 3.5 mm.—Black, sparsely cinereous-pollinose. Head black, vertex and occiput velvet black, opaque. Face cinereous; a shining black triangle encroaches on the vertex above the antennæ. Antennæ black, short, less than one-half the length of the head, third joint conical, a little longer than its thickened style. Eyes shallowly emarginate at antennæ. Palpi black, with both pale and black hairs; proboscis black, not exceeding one-third the height of the head. Dorsum of thorax very lightly pale pubescent, almost blue-black when viewed from in back, subshining, cinereous when viewed from in front, the serial bristles pale, very short; pleuræ and coxæ cinereous. Abdomen finely cinereous, subshining, venter more gray; hypopygium cinereous, with smooth side pieces bearing a small posterior fringe of yellow hairs. Anterior faces of coxæ covered with yellow hair; femora and tibiæ subshining, black, except knees, tarsi more opaque black; anterior metatarsi moderately enlarged, slightly longer than the rest of the tarsus, not pilose; posterior tibiæ and tarsi densely covered with pale hairs. Halteres infuscated. Wings clear hyaline, veins firm, fuscous, stigma very obsolete, second submarginal cell normal.

A single male collected by Dr. Hough in Massachusetts.

Hilara carbonaria sp. nov.

Length 3 mm.—Black over all except wings (halteres missing of all the specimens, but most probably black also). Thorax, occiput and front black, velvety; ocellar triangle not raised; antennæ two-thirds the height of the head, third joint thickened, not finely pointed, twice as long as basal joints together, the arista short, thickened, eyes not deeply notched at antennæ. Proboscis slender, pointed, in length equal to the antennæ; palpi generally hanging down and then longer than proboscis. Thorax very little shining along sides when viewed from the side. Seen from the front the dorsum has two faint piceous-gray glabrous stripes extending nearly to the scutellum. Vertex, thoracic dorsum, margins of abdominal segments and base of hypopygium with small black bristles, longer on hypopygium; scutellum with four marginal bristles, the inner pair long. Abdomen moderately shining; hypopygium large, compressed, almost carinate, abruptly rounding the abdomen, no parts exposed. Legs wholly black, anterior metatarsus of the male not much enlarged, shorter than the remainder of the tarsus, but little thicker than the tibia, hairy, and with a few bristles above; bases of legs moderately shining; femora and tibiæ bristly; hind tibiæ straight, very slightly compressed. Wings whitish, veins pale fuscous, no stigma, first vein thickened near insertion in costa, venation normal.

Two males and five females; New Bedford, Mass., June 12th.

This species is distinct from *velutina* Loew by the coloration of the wings and the absence of stigma.

Hilara congregaria sp. nov.

Length 4 mm.—Head and thorax gray-black, faintly glaucous, slightly shining. Eyes narrowly, moderately deeply emarginate at antennæ. Antennæ black, third joint lanceolate, short, style thick, somewhat shorter than the third antennal joint. Occipital bristles brownish. Palpi testaceous, underside with pale hairs; each provided with a long dark seta exceeding the antenna in length, arising from the outer third of the underside. Proboscis black, generally shorter than one-half the height of the head. Thoracic bristles brown, acrostichals arranged in three series, thorax not vittate; scutellum with four marginal piceous bristles, the inner pair long; metathorax black, glaucous. The sparse marginal hairs of the abdominal sclerites pale. Abdomen piceous, sometimes fuscous at base; hypopygium compressed, not longer than the end of the abdomen, lateral valves small, serrate above, filament hidden. Legs pale testaceous, except the piceous front tarsi of the male, the hind tibiæ of the female and the gradually darkened remaining tarsi of both sexes; outer edge of anterior tibiæ and metatarsi of the male with pale downy hairs, at the tip of the tibiæ are a couple of stouter, darker hairs; no long hairs on remainder of legs, except on all the coxæ; anterior male metatarsi oblong, thickened, subequal to the remainder of the tarsus, anterior tibiæ slightly cylindrically thickened; female with anterior legs plain, a few short bristly hairs on anterior surface of middle femora, posterior femora curved, and posterior tibiæ incrassate, fusiform, as thick as the femora. Halteres testaceous. Wings clear hyaline, stigma at most very faint, veins light fuscous, neuration normal.

Thirteen males and seven females; Monterey Co., California, July 23, 1896. Collected by Dr. Wheeler.

On account of the rarely fuscous base of the abdomen, this species may become confused with *basalis* Loew, from which it may be readily distinguished by the brownish thoracic bristles.

This species, together with *nugax* sp. nov., is the *Hilara* mentioned by Mr. Wheeler in his paper on "Anemotropism and other Tropisms in Insects, p. 375,"* as dancing in swarms.

Hilara nugax sp. nov.

This species differs from *congregaria* as follows:

Male.—Thoracic and cephalic bristles slightly longer and stouter, darker, piceous or black. Antennal style more slender. Palpi piceous, with darker hairs. Hypopygial lamellæ not serrated. Legs darker testaceous, piceous or black from the middle of the tibiæ; anterior metatarsi without long hairs above, underside straight. Halteres fuscous. Wings cinereous hyaline; veins darker fuscous, stigma dark fuscous.

Female.—Differs from the male thus: legs lighter in color, tibiæ with more reddish, metatarsi not incrassate. The hind tibiæ of the female are not at all thickened.

Twenty nine males and twenty-four females; Monterey Co., California, July 3 to 23, 1896. Collected by Dr. Wheeler.

HORMOPEZA Zetterstedt.

Rather small species. Antennæ much shorter than the head, apparently two-jointed, the terminal joint ovate, compressed, with a short, thick end-bristle. Eyes of the male contiguous above. Hypopygium of the male rounded, consisting of two convex, shining, hemispherical plates, between which reaches a short hairy process. Legs simple. Wings as in *Hilara*.

The species are distinguished from *Hilara* by the contiguous eyes of the males, the simple metatarsi of the males, and by the structure of the antennæ.

Stigma and veins fuscous; third antennal joint oval; knob of halteres blackish. **nigricans** Loew.
No stigma, veins pale..2.
2. Third antennal joint oval; halteres and legs luteous ......**bullata** sp. nov.
Third antennal joint globose; halteres and legs fuscous. **brevicornis** Loew.

Hormopeza brevicornis Loew (Fig. 87).

Cent. v, 65.

Head black, eyes of the male contiguous. Front shining above the antennæ.

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* Archiv fuer Entwickelungsmechanik der Organismen. 8th Band, 3rd Heft. 1899.

Antennæ very short; first two joints short, yellowish; the third joint globose, black; the terminal short style black, its basal joint thick, its apical joint slender. Proboscis very short, thick, blunt, blackish brown; palpi minute, recurved, dirty white. Thorax black, cinereo-pollinose, opaque, clothed with pale hairs. Scutellum concolorous. Abdomen black, shining, with pale hairs; hypopygium concolorous. Legs fuscous, the apex of the coxæ, the very base of the femora, and the knees often luteous. Knob of the halteres subfuscous. Wings whitish, veins pale, no stigma. 3.3–3.5 mm.

Yukon River (Kennicott); South Dakota, Idaho, Wyoming.

These specimens exhibit in addition the following characters: The eyes of the males are large, occupying nearly the whole head, the upper facets large, the lower very small, the two sizes of facets well separated on a horizontal line. The abdomen of the male is more shining than in the female (of both sexes the base is almost translucent); the hypopygium is terminal, of moderate size, consisting of two convex, shining, side-pieces, and a dorsal short, backward-pointing, curved process. The head and thorax have a slight but distinct metallic tinge beneath the pollinous coating. The wings are broader, shorter and blunter than in *bullata;* the costal cell is well filled with brown. Lastly, the pulvilli are of dusky color and of normal size.

Hormopeza bullata sp. nov. (Fig. 88).

Female. Length 4.5 mm.—Head and thorax opaque black, abdomen shining black. Eyes widely separated. Antennæ a little more than one-third the eye height, stubby, black, third joint somewhat velvety, swollen, longer than broad, with a short, thick bristle. Palpi short, directed forward, luteous. Proboscis short, thick, black, in length one third the eye height. Postocular yellow bristles serially arranged. Thorax opaque-black, with a light cinereous or yellow tinge; bristles yellow, acrostichals and part of dorsals small, others long; scutellum with six long bristles, the apical pair of which are not close together. Pleuræ lightly cinereous-dusted. Abdomen compressed, shining black, with scattered, pale, short hairs; venter rufous to black. Coxæ and legs yellowish, uniformly colored, except the dusky tarsi; legs slender, tarsal joints oblong, gradually decreasing in length, four pairs of bristles on the hind tibiæ, hind femora with longest bristle-like hairs on the outer side near the tip, middle and front tibiæ with a few small bristles, pulvilli enlarged, pale yellow. Halteres yellow, dusky at extreme tip. Wings narrow, clear hyaline, nervures pale, brownish along costa, no stigma, anal angle prominent, costal cell opalescent.

While this species closely resembles *brevicornis,* its habitus is so different as to render it easily distinguishable. The larger size, the narrower, longer, more pointed wings, the large pulvilli, the oval third joint of the antennæ which also are a little longer, the opalescent costal cell, the opaque velvet black of the head and thoracic dorsum, the black base to the antennæ, the solid black of the base of the abdomen, and the luteous halteres and legs, are all peculiar to this species.

Described from three females, from Jackson's Lake, Wyoming. Collected by Dr. Wm. M. Wheeler.

Hormopeza nigricans Loew.

Cent. v, 66.

Wholly black, with pale pile. Head concolorous, eyes of the male contiguous. Antennæ short, black, third joint oval, the basal joint of the short style thick, the apical one slender. Proboscis very short, thick, blunt, blackish brown; palpi small, recurved, dull white. Thorax opaque, cinereo-pollinose. Scutellum concolorous. Abdomen black, shining, hypopygium the same. Legs black, the apex of the coxæ and the knees luteous. Knob of the halteres blackish brown. Wings cinereous hyaline, stigma and veins fuscous. 4.1 mm.

Yukon River (Kennicott); Moscow, Idaho (J. M. Aldrich).

GLOMA Meigen.

= [illegible]

Species of blackish or yellowish color. Antennæ shorter than the head, third joint oval, with a rather stout terminal arista, proboscis thick, not longer than the head. Eyes of the male contiguous above, of the female separated. Thorax rather prominent; abdomen compressed. Legs simple, the hind ones lengthened. Wings rather broad, the third vein imperfectly (?) forked; discal cell with three veins; anal cell shorter than the second basal, both bounded by a cross-vein almost parallel with the hind margin.

Yellow, red above; tarsi fuscous towards tip.................... **rufa** Loew.
Black. abdomen yellowish basally..2.
2. Legs simple.. **obscura** Loew.
Front tarsi and middle tibiæ in part swollen and hairy. **scopifera** Coquillett.

The generic position of *Gloma phthia* Walker* cannot be determined from his description. It is therefore useless to repeat the diagnosis.

Gloma rufa Loew.

Cent. v, 67.

Yellow, reddish above, black-pilose. Head black, cinereous with white pollen. Proboscis and palpi yellow. First two joints of the antennæ rather short, yellow, black-pilose; third joint black, ovate, apex subacute, the seta rather thick, black. Tarsi fuscous towards the apex. Wings grayish yellow, stigma tinged a little darker, veins pale fuscous, yellow towards base and costa. 5 mm.

New Hampshire (Osten Sacken).

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* Walker, List of Dipterous Insects, etc., iii, p. 492.

Gloma obscura Loew (Fig. 93).

Cent. v, 68.

Black, black-pilose. Head black, proboscis fuscous, palpi blackish. Antennæ black, first two joints rather short, black-pilose, the third short, ovate, the rather thick seta black. Abdomen shining, black, or piceous, base on each side yellowish, almost pellucid. Coxæ and legs yellowish, the hind femora and tibiæ infuscated apically, the last two joints of the tarsi black. Halteres yellowish. Wings grayish fuscous, stigma a little darker, veins fuscous. 5 mm.

New Hampshire, Idaho.

The third vein is perfectly furcate in the specimen in the collection.

Gloma scopifera Coquillett.

Proc. Wash. Acad. Sci., 1900, p. 412.

Male. Length 6 mm.—Black, a humeral dot, the halteres, second and third segments of the abdomen, except middle of dorsum, underside of fourth segment, and the legs, yellow, the greater part of the coxæ, middle of femora, apices of tibiæ, last two joints of front and middle tarsi, and whole of hind tarsi, except bases of first two joints, brown; all hairs and bristles black. Third joint of antennæ slightly longer than wide, less than half as long as the style. Thorax somewhat opaque, thinly gray pruinose. Abdomen slightly polished. Front tibiæ at apices bearing a dense cluster of rather long bristly hairs, last two joints of the front tarsi greatly dilated and fringed along the sides with short bristly hairs, middle femora beyond the middle of the underside bearing a cluster of about three long bristles, middle tibiæ swollen at middle of underside, the swelling densely covered with short, bristly hairs. Wings grayish hyaline, veins and stigma brown.

Alaska (Prof. T. Kincaid).

RAGAS Walker.

Small, slightly hairy species of black ground-color. Antennæ three-jointed, shorter than the head, the first two joints short, the third lanceolate, lengthened, provided with a short two-jointed arista, the second joint of which is very fine. Proboscis short, not porrect; palpi lengthened, provided with a few hairs beneath. Eyes of the female separated, of the male narrowly separated, the face long, the vertex short. Thorax short and rather broad, prominent. Legs rather long, intermediate femora of the male in our species without a spine. Wings with the third vein furcate, the upper branch not perpendicular; discal cell sending out three posterior veins; anal cell shorter than the second basal cell; anal angle not prominent.

Scutellum with six pale hairs	**mabelæ** sp. nov.
Scutellum with ten black bristles	**conjuncta** Coquillett.

Ragas mabelæ sp. nov. (Fig. 98).

Male. Length 3 mm.—Black species, covered with cinereous dust. Face very narrow, silvery, palpi white. Dorsum of the thorax diffused brownish, with four brown vittæ, the lateral two abbreviated anteriorly. Scutellum with six equidistant uniform pale marginal hairs. Abdomen slender, dusted with cinereous, the hypopygium terminal, projecting, globose and closed, dusted with cinereous, except beyond the margins of the broad, convex middle lamellæ. Legs slender, simple, devoid of any bristles, yellow, the tarsi apically and the hind legs from the middle of the femora outwardly brown; pulvilli small, square, empodium linear. Wings hyaline, with a very faint brownish tinge, veins dark brown; the costa curves outward to accomodate itself to the elongate faint stigma; marginal cell extending to the middle of the second submarginal cell; anal vein vanishing.

One male; Moscow, Idaho (Prof. J. M. Aldrich).

This is the first reported occurrence of this genus in America.

Ragas conjuncta Coquillett.

Empis conjuncta Coq., Proc. Wash. Acad. Sci., 1900, p. 411.

Black, the halteres and legs dark brown; venter of abdomen dark brown. Eyes of male contiguous. Third antennal joint linear, long, its style minute. Proboscis shorter than the head. Hairs and bristles of thorax and scutellum black; thorax very thinly gray pollinose, not distinctly vittate, scutellum bearing ten marginal bristles; abdomen slightly polished, hypopygium wholly and sparsely covered with bristly hairs, the dorsal piece bearing a pair of long subcylindrical, fleshy processes, which are covered with short hairs, filament free. Wings hyaline, veins and stigma brown. 2.5 mm.

Alaska (Prof. T. Kincaid).

The characters given above have been drawn from the description of *Empis triangula* Coq., which the present species is said to resemble, except in its generic characters. Its position in the genus *Ragas* is evident from Mr. Coquillett's résumé: "classified by its short proboscis, this species would be placed in the genus *Hilara;* but its elongated third antennal joint with the minute style, the contiguous eyes of the male and the slender first joint of his front tarsi, indicate a nearer relationship with the typical species of the genus *Empis.*"

In the structure of the appendages of the hypopygium this species departs widely from *mabelæ,* but this difference is not of generic importance, as similar cases occur, *e. g.*, in the genus *Brachystoma.* The females of *B. occidentalis* and *vesiculosum* Fab. are undoubtedly related, but the males of the former bear prominent annexes to the lamellæ while in the latter they are wanting, judging from Mr. Mik's description.*

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* Ent. Nachr., 1894, p. 154.

LAMPREMPIS gen. nov.

Lamprempis Wheeler et Melander (Subgen. *Empis*), Biol. Cent. Am., 1901, Dipt. Suppl., p. 366.

Small, short, broad, greatly humpbacked, metallic blue or blue-green flies. Eyes of the male contiguous. Thorax often with bushy short pubescence, the macrochætæ much reduced, either wanting or hair-like, even on the scutellar margin. Hypopygium prominent, three lateral valves varyingly developed, the central filament much reduced, generally apparently wanting. Legs of both sexes ornamented, of the female ciliate with scales or hairs on the edges, of the male sometimes more or less pennate. *Chichimeca* possesses remarkable processes on the male hind leg which are developed not alone at the knee, where similar processes are developed in typical *Empis*, when they occur, but also on the distal portion of the tibia and on the metatarsus; in *benigna* and *superba* also, there are thickenings in the same places; *violacea*, the only other species of which the male is known has no similar thickenings of the legs, but has instead the pennate ornamentation. Wings with the characteristic brownish tinge of the Mexican flies, more or less developed, most conspicuous along the costa; the veins narrow, brownish, becoming faint posteriorly, especially the anal and sometimes the fifth also; the third vein furcate far beyond the end of the marginal cell, its anterior branch perpendicular.

Wings hyaline, marked with black; hind legs of males with scales. **violacea** Loew.
Wings uniformly blackish; legs of male simple .... **superba** Loew.
Wings hyaline or yellowish .... 2.
2. Tarsi black; middle and hind femora and tibiæ with flat scales on both edges (female) .... **cyanea** Bellardi.
Tarsi at most fuscous .... 3.
3. Wings clear hyaline; legs not ciliate with scales (female) .... **suavis** Loew.
Wings of a yellowish tinge .... 4.
4. Scales dense on both sides of the middle and hind femora and tibiæ (female); hind femora, tibiæ and metatarsi each with a peculiar process (male); wings uniformly colored .... **chichimeca** Wheeler et Melander.
Scales few on the upper side of the femora (female); wings darker on the anteroproximal portion .... 5.
5. Hind tibiæ and metatarsi each with a brush of hairs (male); third antennal joint shorter than the first two united ...... **benigna** Osten Sacken.
Third antennal joint about equalling the first two. **diaphorina** Osten Sacken.

Lamprempis violacea Loew (Figs. 103, 104).

Cent. viii, 55.

Male.—Blue, shining, covered with fine black pile. Head blue-black; eyes contiguous; first two joints of the antennæ dull testaceous, third joint rather short, ovate, black, provided with a style equal to itself; proboscis short, piceous. Dorsum of thorax greenish blue; pleuræ piceous, opaque, shining blue before the base of the wings; pile in front of the halteres black. Color of the abdomen brassy blue, changing to violaceous towards the tip. Hypopygium small, short, black and black-pilose, supported by the last ventral segment which is arched and clothed with black pile; lateral lamellæ short, upper lamellæ excised; penis exposed, very slender towards the tip. Legs dark piceous, black-pilose, of the front and middle legs, the apical third of the femora, and the tibiæ except the tip, of the hind legs, the knees, the second and third joints of all the tarsi, together with the extreme apex and basal fourth of the first joint, pale lutescent; the front and middle tibiæ above with ordinary pile, towards the apex with compressed pile; the front and middle metatarsi above short-pennate; of the hind legs, the tibiæ and the femora compressed, the tibiæ pennate above, below with dense pile, the femora on both sides with feathery scales. Halteres blackish brown. Wings clear hyaline, the base, the costa, and the edges of the discal cell bordered very broadly with black, so that, except for a triangle extending from the axillary margin to the fourth vein, and except for the spot in the discal cell contiguous with the front margin of the triangle, the three posterior cells are hyaline, the basal half of the first and the base of the others excepted. The third longitudinal vein, besides the anterior, perpendicular, and slightly recurved branch sends another short branch into the first posterior cell, equidistant from the median cross-vein and the apex of the wing; discal cell broad, obliquely truncate; the fourth longitudinal and the intercalary veins slender, evanescent before the margin of the wing. 3.5 mm.

Mexico (Deppe, Berlin Museum).

One injured specimen labelled Mexico answers with this description, except that the hypopygium is broadly open, and evidently of different conformation.

Lamprempis superba Loew.

Cent. viii, 57.

Male.—Brassy black. Proboscis equal to the head and thorax combined, fuscous. Antennæ black, the first two joints black-pilose, the first somewhat long, the apical style whitish. Eyes contiguous. Thorax and scutellum brassy green, shining, clothed with short black pile. Pleuræ brownish black, opaque, with a small subalar callosity and a median spot blue-green, black pilose in front of the fuscous halteres. Abdomen blue-green, merging into very bright cupreous towards the apex and chalybeous at the very tip. Legs black, closely covered with short concolorous pile, the tibiæ and the first joint of the tarsi moderately thickened, the front femora except the tip luteous, and the other femora circled by a subapical, very broad, luteous ring. Wings black, the front branch of the third longitudinal vein ascending straight to the costa. 4 mm.

Cuba (Poey).

Lamprempis cyanea Bellardi.

Mem. d. Reale Accad. d. Scienze d. Torino, Ser. 2, vol. xxi, p. 199.

Female.—Metallic blue. Front broad, deep, shining, blue-black; first antennal joint long, cylindrical, black, with long, dense, black hairs; second joint very short, black, black-pilose; third joint wanting. Proboscis equal in length to the thorax and head together. Occiput black, at the margin provided with long black bristles. Thorax much convex, black-pilose, shining, green-black, metallic, with faint vittæ; pleuræ and pectus jet black, from thence submetallic. Scutellum green-black, metallic, with long, black hairs on the posterior margin. Halteres wanting. Abdomen acute apically, cyaneous, metallic, black-pilose at the base. Front and middle legs short, hind ones gone; coxæ black; front femora broadly black at the base, apically yellow; front tibiæ broadly yellow at the base, and apically black; front tarsi wholly black, first joint long and much thickened; middle legs yellow, with the very base of the femora and the extreme tip of the tibiæ, and all the tarsal joints black; front femora and front and middle tarsi dark yellow-tomentose; front and middle tibiæ and middle femora with rather long yellow cilia. Wings hyaline, fuscescent towards the base; submarginal vein straight, perpendicular to the third vein. 4 mm.

Angang, Mexico (Saussure).

In addition to this diagnosis the following points drawn from a female specimen from Amola in Guerrero, Mexico, will be of service:—Third antennal joint shorter than the first two united, pointed, its slender style equalling its own length. Mesonotum evittate. Hind femora and tibiæ fringed with scales on both sides, hind metatarsi not fringed; front metatarsi elongate, flattened and fringed.

Lamprempis suavis Loew.

Cent. viii, 56

Female.—Front and face blue-green, shining; occiput chalybeous, moderately shining. Antennæ black, the first joint rather long, the third ovate, its bristle shorter than itself; proboscis a little longer than the head. Thoracic dorsum green, shining, chalybeous on the posterior margin. Pleuræ almost black, but green and shining before the base of the wings. Abdomen rather thick, bright chalybeous, shining. Femora piceous, extreme tip luteous; tibiæ lutescent, a little darker towards the tip, the apex of the hind ones fuscous; front tarsi fuscous, the middle joints lutescent, the first thickened; middle and hind tarsi pale lutescent, the last joints black. Halteres black. Wings very clear hyaline, veins fuscous; the first section of the fourth longitudinal vein altogether obsolete, its last part and the intercalary vein very slender, of a lighter color and vanishing before the tip of the wing; the sixth vein much abbreviated; the anterior branch of the third vein straight and perpendicular. 2.5 mm.

Mexico (Deppe, Berlin Museum).

A single female from Chilpancingo in Guerrero, Mexico, has the whole of the fourth vein uniformly developed.

Lamprempis chichimeca Wheeler et Melander (Figs. 100, 101, 102).

Biol. Cent. Am., Dipt. Suppl., p. 368, Nov. 1901.

Male.—Shining metallic green. Face and occiput black, dusted with white. Eyes contiguous on the front. Proboscis nearly as long as the head. Antennæ black; third joint shorter than the first and second joints taken together, very nearly the length of the first joint; style very short. Mesonotum shining, metallic blue-green, with three deep blue stripes anteriorly, and beset with erect and rather dense brownish black hairs. Abdomen metallic green, with black hair. Hypopygium small, black, with only the base of the filament exposed. Pleuræ shining black, metallic blue-green anteriorly, dusted with white posteriorly. Legs black, covered with black hairs; knees, fore and middle tibiæ and all the tarsi yellow. Fore metatarsi thickened, nearly as long as the remaining tarsal joints taken together. Middle legs plain. Hind femora on the inner inferior side with two slender finger-like processes, with an emargination between them; hind tibiæ on the inner side with a stout subapical scoop-shaped process, truncated and flattened at the extremity; hind metatarsi incrassate, somewhat concave on the plantar side, and bearing on the outer side a prominent pointed projection tipped with two small black spines. Halteres black. Wings tinged with brown, yellowish anteriorly; veins yellow; stigma fuscous, slender and inconspicuous; anterior branch of the third vein short, rectangular.

Female.—Color, especially of the abdomen, more metallic blue. Face shining metallic blue. Middle femora below, hind femora above and below, and the four posterior tibiæ on their inner and outer sides, with thick-set rows of black scale-like hairs. Middle and hind tibiæ grooved on the outer side. Fore metatarsi incrassate, as in the male, hind metatarsi less thickened, and the legs wholly without the peculiar processes of the male. Stigma of the wings obsolete. 4-5 mm.

Guerrero, Mexico (Smith).

Lamprempis diaphorina Osten Sacken.

Biol. Cent. Am., Dipt. ~~Suppl., 1900~~ 1887, p. 215.

Female.—Antennæ black; third joint elongate, about as long as the first two united, with a short style. Occiput hoary, beset with black pile; front metallic green. Thorax metallic green, shining, with a vestige of three pollinose stripes on the dorsum, the latter sparsely beset with long, erect, black pile; meso- and sternopleura shining, metallic green; pteropleura black, slightly hoary; the fan-like row of bristles black; halteres black; metanotum slightly pulverulent. Abdomen metallic bluish, greenish at the base. Legs brownish yellow, the tips of the tarsi brown; the first pair beset with moderately long, delicate hairs, their first tarsal joint long, swollen; on the middle pair the hairs are shorter and more dense, fringe-like, especially on the underside of the femora; the hind tibiæ are broad and flattened, and bear on each side a fringe of long, stout, almost scale-like hairs; similar fringes on the hind femora, but less conspicuous; coxæ black; trochanters brown. Wings with a pale brownish yellow tinge toward the root of the anterior margin; stigma hardly visible; hind margin grayish; the branch of the third vein nearly perpendicular; the first vein issuing from the discal cell turning anteriorly before its end; the first and second veins reach the margin, but are very thin and evanescent before it. Length about 4 mm.

Ciudad in Durango, Mexico.

Lamprempis benigna Osten Sacken.

Biol. Cent. Am., Dipt. ~~Suppl., 1900~~ 1887, p. 215.

Male and Female.—Antennæ black; third joint a little shorter than the preceding two joints united, the division or suture occupying two-thirds its length and very distinct, the style short and stout. Face and front very dark metallic, shining, almost black. Thorax metallic green, shining, beset with long, erect, black pile; pleura metallic green, shining anteriorly, black, slightly hoary posteriorly; halteres and the fan-like bristles in front of them black. Abdomen metallic green (male), or metallic blue, green at the base (female); male genitals black. Legs black, the last pair of coxæ slightly pulverulent at the base, the knees slightly brownish yellow, the tarsi brown and with their first joint but slightly incrassate; in the male beset with long, soft, blackish hairs, the tip of the hind tibiæ bearing on the underside a small brush of very short, stiff bristles (which produces the appearance of an incrassation), and the yellowish brown first joint of the hind tarsi having on the underside a similar brush of bristles at the base, followed by a distinct emargination; in the female the middle femora on the underside, the middle tibiæ, and the hind femora and tibiæ on both sides, beset with fringes of long scale-like hairs, the hind tibiæ broadened, and with a groove on the outside. Wings of the male subhyaline, with a slight yellowish tinge in the subcostal cell, especially in the stigma; in the female this yellow tinge is more extended and occupies the whole antero-proximal half; venation as in *E. diaphorina*.

Mexico.

EMPIS Linnaeus.

Species of three to nine mm. in length (an undescribed female of uncertain provenience, probably Yucatan, measures ten mm.), often nearly glabrous, sometimes covered with long hairs, of black, gray or yellowish body color more or less completely concealed beneath a coating of grayish pollen, often with the legs peculiarly ornamented, the males with processes or swellings, the females sometimes with scale-like hairs. Antennæ generally longer than the head, the second joint shorter than the others except very rarely, the first two joints more or less cylindrical, the third compressed, lengthened, with a short, bristle-like terminal style. Proboscis at least as long as the head, frequently longer, stout, adapted for piercing, the labella of variable length. Eyes of the male separated or contiguous, of the female always separated. Thorax large, generally vittate, the darker vittæ generally in pairs; abdomen long, in the male generally narrow and with large genitalia of peculiar and variable form, consisting of two paired valves and a central filament, in the female generally flattened at the base and pointed apically, ending in two small narrow lamellæ. Sometimes the male venter is armed with processes near the tip and much distorted. Legs generally slender, more or less hairy and bristly, more prominently so in the male than in the female, the hind ones longest, often compressed and then generally ciliate with scales or hairs along the edges; hind legs of the male frequently armed at the knees or trochanters; fore metatarsi of the males sometimes enlarged. Wings generally narrow, with the front and hind margin more or less parallel, the discal cell always present, emitting three simple veins to the wing margin; third vein always furcate; anal cell shorter than the second basal, both bounded by a vein nearly parallel with the hind margin of the wing; anal angle prominent, but rarely projecting.

Several attempts have already been made to divide this complex genus into groups of species. Dr. Loew in a series of papers in the Berliner Entomologischer Zeitschrift, vol. xi–xiii, has grouped the European species about a few typical forms, and the same may be done with more or less completeness in the case of the American species. The genus *Enoplempis*, erected by M. Bigot* for those species of *Empis*, the males of which have armed hind knees, fell in Mr. Coquillett's Revision. His reasons for the abandonment of the genus were that it was established on characters found in the male sex only, and that the females were indistinguishable from typical *Empis*. Although this may not be a sufficient reason for the dissolution of a genus; for example, witness those dolichopodid genera founded on male characters alone, such as *Polymedon*, which are considered valid, yet *Enoplempis* is not here reinstated with generic value, as it merges with other *Empis* through the species *nodipes* on the one side and *teres* on the other.

The subgenus *Lamprempis* † deserves a better fate, for as yet, it is very exclusive and probably will always remain so. Its distinctive character, a color difference, it is true, is yet so deep seated that it can be regarded as morphological. Intergrades between the yellows and blacks of *Empis* are common, but an intergrade between the metallic blue of this group and the ordinary color of *Empis* would be difficult to conceive of, and hence, especially as the species all present a similar facies which is quite different from that of the rest of the group, we feel justified in raising *Lamprempis* to the rank of a genus.

Empimorpha, founded by Mr. Coquillett on *Empis barbata* Loew, has been allowed to remain as a distinct genus, although its relationships with the group *Aldrichii* of *Empis* are quite evident.

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* Bull. Soc. Ent. France, 1880, p. 47.

† Wheeler et Melander, Biol. Cent. Am., Nov., 1901, p. 366.

The species *E. sociabilis* Williston [*] (synonym *Rhamphomyia abdita* Coquillett) is not included in the table as it is a true *Rhamphomyia*, and was originally given as *Empis* only through a typographical error.

Two of Walker's species, *agasthus* [†] and *reciproca* [‡] have been dropped, and, likewise, Loew's *poplitea* has been omitted from the table on account of insufficient characterization.

In attempting to place species with the aid of the following table, too much reliance must not be placed on the wording, as this genus, and indeed the whole family as well, is in a state of extreme "morphological restlessness." The instability of the species manifests itself often in the coloration, often in the chætotaxy. Stress is laid in the key on the number of scutellar and metapleural bristles, but this character is variable and often misleading, so that only within certain limits can it be accepted. Moreover, greasy, immature, or rubbed specimens may often lead one astray; thus it is only after a comparative knowledge of a number of forms that a determination may be relied upon.

More or less yellow species, *i. e.*, pleuræ largely yellow, thoracic dorsum at least partly yellow along the sides .... 2.

Black, gray, or brown species; pleuræ never yellow .... 2~~2~~.1

2. Occiput black, more or less cinereous dusted .... 3.

Occiput yellow .... 17.

3. Thorax and abdomen unicolorous, red .... 4.

Thorax and abdomen more or less vittate with blackish .... 5.

4. Stigma distinct; anterior branch of the third vein perpendicular; body with no black bristles .... **rubida** Wheeler et Melander.

Stigma wanting; second submarginal cell acute; body with black bristles. **rufescens** Loew.

5. Halteres blackish; thorax with a longitudinal black stripe. **leptogastra** Loew.

Halteres whitish or reddish .... 6.

6. Dorsum of thorax evenly blackish; antennæ black .... 7.

Dorsum of the thorax with darker vittæ .... 10.

7. Sides of the thorax and venter with long yellow pile. **laniventris** Escholtz.

Not yellow pilose .... 8.

8. Tibiæ apically blackish .... **loripedis** Coquillett.

Tibiæ yellow .... 9.

9. Abdomen opaque .... **amytis** Walker.

Abdomen shining .... **gladiator** sp. nov.

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[*] Kans. Univ. Quart., vol. ii, p. 76.

[†] List of Dipt. Ins, iii, p. 496.

[‡] Trans. Ent. Soc. Lond., N. Ser., iv, p. 147.

10. Thorax trivittate..**tridentata** Coquillett.
Thorax not trivittate..11.
11. Abdomen largely black..12.
Abdomen largely yellow..16.
12. Antennæ black..13.
Antennæ fuscous at base..15.
13. Shining; abdomen in part yellow..14.
Abdomen wholly black..**ollius** Walker.
14. Tip of hind tibiæ black..**loripedis** Coquillett.
Tip of hind tibiæ yellowish..**gladiator** sp. nov.
15. Tip of femora black..**eudamidas** Walker.
Tip of hind femora concolorous with rest, reddish.......**abcirus** Walker.
16. Base of abdominal segments fuscous, rest yellow..........**sordida** Loew.
Tip of abdominal segments blackish, rest yellowish......**longipes** Loew.
Whole insect yellow...................female of **humile** Coquillett (?).
17. Cross-veins bordered with brown..................**pœciloptera** Loew.
Cross-veins not bordered..18.
18. Thorax with five vittæ; hind femora fuscous above...........**mira** Bigot.
Thorax not vittate; femora not darkened above........................19.
19. Abdomen yellow, with rather long yellow pile.............**pallida** Loew.
Abdomen fuscous, with short black hairs..20.
20. Antennæ yellow basally; thorax opaque................**armipes** Loew.
Antennæ black; thorax shining.....................**colonica** Walker.
21. Pile of thorax and at base of abdomen in part pale....................22.
Pile wholly black..31.
22. Species of 3 mm..23.
Larger species of 5-10 mm..25.
23. Stigma dark fuscous; antennæ black.....................**obesa** Loew.
Stigma wanting; antennæ reddish at base........................24.
24. Abdomen more or less yellow........................**compta** Coquillett.
Abdomen wholly black...............................**varipes** Loew.
25. Knob of halteres black; abdomen largely shining....................26.
Halteres yellow; abdomen opaque..27.
26. Mesonotal hairs white...........................**comantis** Coquillett.
Mesonotal hairs black.....................**brachystoma** Coquillett.
27. Scutellum with 6 to 8 bristles; antennæ black.......**ravida** Coquillett.
Scutellum with fewer bristles; antennæ red basally....................28.
28. Dorsum of abdomen brown pollinose; scutellum with two bristles; legs of female ciliate, with short black scales..........**captus** Coquillett.
Scutellum with 4 bristles; legs not feathered........................29.
29. Pile of body luteous...............................**Aldrichii** sp. nov.
Pile of body white..30.
30. Stigma brown, wings gray; abdomen blue-gray pollinose. **avida** Coquillett.
Stigma wanting, wings whitish; abdomen brown-pollinose. **lævicula** Coquillett.
31. Fourth vein incomplete; thorax evittate; eyes of male contiguous (of the known males)..32.

Fourth vein reaching the margin of the wing; thorax almost always conspicuously vittate; eyes of the males separated (as far as known with very few exceptions) ....39.

32. Wings spotted with brown, anterior branch of the third vein perpendicular ....33.

Wings unspotted, first submarginal cell open ....34.

33. First submarginal cell generally closed; fourth vein not forked.
clausa Coquillett.

First submarginal cell open; the shortened fourth vein furcate.
spiloptera Wiedemann.

34. Third antennal joint five times as long as wide, style minute.
triangula Coquillett.

Thirt joint shorter, style comparatively longer..........................35.

35. Second submarginal cell wider than the first posterior cell...**distans** Loew.

Second submarginal cell subequal in width to the first posterior..........36.

36. Wings dark brown..37.

Wings but little infumated...38.

37. Knob of halteres yellowish above; eastern species.........**labiata** Loew.

Halteres black, with paler pedicel; Mexican species...**totipennis** Bellardi.

38. Joints of the male front tarsi globose and provided with long hairs.
asema sp. nov.

Joints of the tarsi slender, not long-hairy.
dolorosa Wheeler et Melander.

39. Legs, at least femora, nearly black or wholly black ....40.

Legs, at least in large part, yellowish or reddish ....55.

40. Abdomen wholly black ....41.

Abdomen yellow at the base; legs of female feathered.
pegasus Osten Sacken.

41. Knob of halteres pale...42.

Knob of halteres at least infuscated.................................49.

42. Eyes of male contiguous; thorax wholly shining........**lævigata** Loew.

Eyes of male separated; thorax vittate...............................43.

43. Venter of male with a subapical process; legs simple; thorax and abdomen somewhat shining..44.

Abdomen of male simple; male hind legs with processes; thorax opaque....47.

44. Ventral process of fifth abdominal segment of male with long hairs......45.

Ventral process with short or no hairs ....46.

45. Mesonotum with three shining vittæ; scutellum with four bristles.
pellucida Coquillett.

Mesonotum evittate; scutellum with six or more bristles.
fumida Coquillett.

46. Ventral process with short hairs; central filament hidden.
virgata Coquillett.

Ventral process devoid of bristles; central filament exposed.
infumata Coquillett.

47. Outer process of hind tibiæ of male simple; middle legs not tipped with many spurs..48.

Outer process of male hind knees large, pronged; middle tibiæ tipped by a circle of spurs......................**serperastrorum** sp. nov.

48. Abdomen largely shining black........................**podagra** sp. nov.
Abdomen wholly opaque pollinose........................**æripes** sp. nov.
49. Wings subhyaline..50.
Wings dark, at least apically.....................................53.
50. Thorax with three gray vittæ; veins strong...........**cormus** Walker.
Thorax black; veins weak..51.
51. Tarsi black..............................**xochitl** Wheeler et Melander.
Tarsi strongly annulate...52.
52. Front metatarsi enlarged; second antennal joint large, yellow. **atrifemur** Wheeler et Melander.
Front metatarsi slender; second antennal joint small, dark. **annulipes** Wheeler et Melander.
53. Scutellum with four bristles......................................54.
Scutellum with about twenty bristles..................**luctuosa** Kirby.
54. Wings pale at base, reddish apically; filament of hypopygium black at base. **bicolor** Bellardi.
Wings dark brown; filament red....**montezuma** Wheeler et Melander.
55. Abdomen conspicuously shining.....................................56.
Abdomen pollinose, opaque...62.
56. Scutellum with two bristles; thorax distinctly quadrivittate......57.
Scutellum with four bristles; lateral vittæ indistinct............60.
57. Hind knees simple; hind margin of the abdominal segments narrowly cinereous..**nuda** Loew.
Hind knees armed in the male; abdomen without cinereous fasciæ......58.
58. Front tibiæ apically, and front metatarsi wholly brown. **loripedis** Coquillett.
Legs almost wholly yellow...59.
59. Humeri yellow..**gladiator** sp. nov.
Humeri dusted with cinereous......................**arthritica** sp. nov.
60. Antennal style one-third as long as the third joint......**otiosa** Coquillett.
Antennal style one-half as long as the third joint................61.
61. Eyes of the male contiguous; abdomen of male deep velvet black at the base; abdomen of female shining black.............**Johnsoni** sp. nov.
Eyes of male separated; abdomen of male shining black over all (female abdomen largely yellow)........................**humile** Coquillett.
62. Abdomen yellow at base............................**tersa** Coquillett.
Abdomen black or brown above......................................63.
63. Antennæ short, reddish at base.................**tenebrosa** Coquillett.
Antennæ black, or with base at most fuscous.......................64.
64. Halteres black; male legs armed, the inner projection of their hind tibiæ with a terminal spur-like brush; upper hypopygial lamellæ projecting; tips of femora, tibiæ and all of tarsi black; a dense bunch of hair in front of the halteres.....................**valentis** Coquillett.
Without all these characters......................................65.
65. Anal vein not reaching the margin; legs slender; wings rather long, pure hyaline..66.
All the veins strong, fuscous.....................................67.

66. Male legs with long hairs on outer part; abdomen of male with white pollen. **teres** sp. nov.

Legs not plumose; abdomen dusted with gray....... **ærobatica** sp. nov.

67. Not more than six long scutellar bristles; if otherwise, the thorax has four broad dark brown vittæ..71.

Generally at least six long scutellar bristles; thorax generally not broadly quadrivittate..68.

68. Tarsi distinctly annulate.............. **annulipes** Wheeler et Melander.

Tarsi uniform in color..69.

69. Abdomen of male with silvery pollen; legs densely hairy. **cæligena** sp. nov.

Abdomen gray or brown pollinose..70.

70. Femora largely black, densely hairy but not spinose. **azteca** Wheeler et Melander.

Femora reddish, spinose below.......... .... **spectabilis** Loew.

71. A long bristle present at the base of the costa......... **manca** Coquillett.

No long costal bristle present..72.

72. Males..73.

Females..86.

73. Legs wholly unarmed, simple..74.

Armament of legs variously modified..75.

74. 4 mm.; femora and tibiæ fuscous apically; central filament of hypopygium hidden; wings narrow...................... **stenoptera** Loew.

6 mm.; femora and tibiæ reddish; central filament narrowly visible; wings normal.................................... **enodis** sp. nov.

75. Hind trochanters with black spines; hind margins of abdominal segments gray..76.

Hind trochanters unarmed..77.

76. Hind tibiæ with short bristles.................. **cacuminifer** sp. nov.

Hind tibiæ with moderately long bristles................... **nuda** Loew.

77. Apex of hind femora and base of hind tibiæ merely swollen, but with a few stiff bristles on inner side.................... **nodipes** sp. nov.

Apex of hind femora and base of hind tibiæ provided with strong apophyses..78.

78. The outer process of the hind tibiæ large, bifurcate. **serperastrorum** sp. nov.

The outer process smaller, not furcate..79.

79. Abdominal incisures fuscous; posterior tibiæ wholly darkened. **cinerea** Bigot.

Abdominal incisures not differentiated..80.

80. Inner side of hind femora with an apical longitudinal fringe of black bristles..81.

Femora with no fringe..83.

81. Scutellum with four bristles....... ....82.

Scutellum with about ten bristles...................... **æripes** sp. nov.

82. Scutellum and parts of body yellow................... **clauda** Coquillett.

Wholly black, gray or brown pollinose...... ...... **mixopolia** sp. nov.

83. Legs slender, reddish; fore metatarsi elongate; occiput with but few hairs..85.

Legs short, thickened; front metatarsi short; occiput densely bristly....84.

84. Third vein furcate beyond the tip of the marginal cell. **dolabraria** sp. nov.

Third vein furcate before the tip of the marginal cell. **dolabraria** subsp. **disconvenita.**

85. Front metatarsi thickened, black; hind tibiæ shaggy...**canaster** sp. nov.

Front metatarsi slender, red; legs not shaggy... ....**falcata** sp. nov.

86. Third antennal joint short and broad; second segment of abdomen with a conspicuous fringe of long black bristles toward the sides; abdomen brownish pollinose............................**gulosa** Coquillett.

Third antennal joint long, slender; abdomen generally gray pollinose....87.

87. Slender species; dusted with whitish; wings narrow; base of the femora and tibiæ paler than the apex.....................**stenoptera** Loew.

Of other conformation...88.

88. Species marked with yellow.........................**clauda** Coquillett.

Ground color wholly black...89.

89. At most three bristles in front of the halteres; antennæ comparatively long..90.

Several bristles in front of the halteres; antennæ shorter...............91.

90. Hind coxæ with conspicuous hairs on their front side ....**falcata** sp. nov.

Hind coxæ with but few apical hairs.......................**nuda** Loew.

91. Third vein furcate beyond the tip of the marginal cell, the posterior branch ending before the apex of the wing; occiput densely bristly ......92.

Furcation of the third vein opposite or in advance of the tip of the marginal cell, the posterior branch terminating at or beyond the wing tip...94.

92. Large gray-white species devoid of brownish pollen; third vein distinctly arched forward so that the first submarginal cell is narrowed. **æripes** sp. nov.

Smaller species, in part brownish pollinose; third vein straight before its furcation ....93.

93. With six scutellar bristles........................**dolabraria** sp. nov.

With four scutellar bristles..........................**mixopolia** sp. nov.

94. Legs glaucous; abdominal segments margined with gray posteriorly. **cacuminifer** sp. nov.

Legs shining; abdomen unicolorous..95.

95. Vein between discal and fourth posterior cells much shorter than that between the third and fourth posterior cells.......................96.

The two sections equal ....**dolabraria** subsp. **disconvenita.**

96. Species of the Middle States; hind tibiæ straight, rather stout cylindrical; hind femora with numerous thorn-like bristles distally. **enodis** sp. nov.

Species of the Western States; hind tibiæ distinctly bent near the knee; bristles of the hind femora longer.....................................97.

97. Coxæ generally wholly black; abdomen brownish dusted; middle tibiæ fimbriate apically with a few stiff black bristles. **serperastrorum** sp. nov.

Coxæ reddish apically; abdomen slaty gray; middle tibiæ not spurred with terminal bristles ....**canaster** sp. nov.

Empis annulipes Wheeler et Melander (Fig. 115).

Biol. Cent. Am., Dipt. Suppl., Nov., 1901, p. 369.

Female.—Black. Front and face dusted with white. Antennæ black; the third joint largely or wholly reddish yellow, about half as long as the first; third joint tapering, about twice the length of the first two together; style very minute. Proboscis reddish, about as long as the thorax. Thorax rather thickly gray dusted, the dust modifying the ground color; mesonotum with four slender darker stripes; pile and bristles black, the former abundant, erect; humeral and postalar callosities reddish. Scutellum with six bristles Abdomen black, grayish dusted, color very variable in different reflections. Legs reddish yellow; front and hind tibiæ on the distal portion, middle tibiæ at the tip, front metatarsi (except the immediate base), and the tips of all the other tarsal joints dark brown or black; front metatarsi elongate and thickened; all the tibiæ with rather dense hairs on the outer side, but not ciliate. Wings uniformly light yellowish brown; discal cell long. Halteres black, with yellow peduncles. 8-9 mm.

Guerrero, Mexico (Smith).

Tr
Empis a~~nt~~ifemor Wheeler et Melander (Figs. 116, 117).
Biol. Cent. Am., Dipt. Suppl., 1901, p. 370.

This species, which is closely allied to *E. annulipes*, was established on a single female specimen from Guerrero, Mexico. It differs from *annulipes* thus; antennæ shorter; the second joint comparatively long, of nearly the same size as the first joint; the first and second joints of the antennæ light yellow, but the first joint a little the darker however; style more slender. Proboscis piceous. Mesonotum apparently evittate. Femora black, the anterior ones brownish towards the tip. Front metatarsi shorter and rather thickened. The hairs of the legs are longer and denser, especially on the hind pair.

Empis montezuma Wheeler et Melander (Fig. 114).
Biol. Cent. Am. Dipt. Suppl., Nov., 1901, p. 369.

Male.—Black, opaque, cinerascent. Eyes contiguous on the vertex. Proboscis one and one-half times the length of the head. Antennæ dark fuscous, first joint short, with a few bristles near the apex, third joint wanting. Thorax black, cinerascent, with indications of a median and two side stripes showing black through the coating, sparsely hairy on the disc, densely and strongly so on the humeri and about the scutellum. Pleuræ and pectus concolorous with the mesonotum; abdomen shining in certain lights, velvet-black in others, fuscous on the venter at the base. Halteres black. Hypopygium small, black; lamellæ incrassate, deeply emarginate, with loose dark hairs and small apical teeth; median style densely, finely plumose; penis exposed, reddish. Legs black, the femora and the base of the tibiæ with a reddish tinge; furnished with spines, hairs and pile, the pile long and denser on the middle femora beneath near the base, the middle tibiæ beneath near the tip, the posterior tibiæ on the outer edge, the first and second tarsal joints and the hind metatarsi outwardly; middle femora and tibiæ arched; front metatarsi equal in length to the next two joints (in *E. bicolor* the metatarsi are longer). Wings uniformly dark fuliginous; neuration as in *E. bicolor.* 6.25 mm.

Jalisco, Mexico (Schumann).

Empis bicolor Bellardi (Figs. 112, 113).

Mem. della Reale Accad. d. Scienze di Torino, Ser. 2, vol. xxi, p. 198.

Female.—Black, cinereous. Eyes widely separated; front and face flat, black, cinereous, dorsum of the thorax with two obsolete vittæ, pilose; pile sparse, black, stiff; pleuræ and pectus concolorous with the thorax; halteres black, at the base fuscous. Abdomen depressed, black, cinerascent and black-pilose. Legs wholly jet black, black tomentose, spinose, and pilose, the tomentum, spines and hairs denser and longer on the inner and outer sides, but not arranged as regular cilia. Wings rounded at the apex, uniformly and rather strongly fuliginous, subhyaline at the extreme base, flavescent. 5 mm.

Cuantla, Mexico (Saussure). Numerous specimens. Guerrero.

The male has the middle metatarsus very short, in the female the tarsal joints are slender and gradually decreasing in length. The male differs thus: eyes contiguous above; face more gray, narrower, though its sides are still parallel; hypopygium slightly ascending, not large, the reddish yellow filament rather strongly recurved, black outwardly, and with tip concealed. Bristles on the legs longer and denser, disposed in patches as in *montezuma.* Middle metatarsi but little more than one-half the length of the following joint; wings uniformly clear, with a flavescent tinge, nerves weak.

It may be thought that *E. montezuma* Wheeler et Melander is a variety of this species. It is indeed closely related. Here, also, the middle metatarsi are short, though they are subequal to the next joint, but the dark broader wings and lighter color of the legs and hypopygium distinguish the form from *bicolor.* None of the ten specimens of *bicolor* examined shows any deviation from the opaque jet black of the legs and body. Moreover, the hypopygial filament of *montezuma* is less recurved and wholly reddish; the discal cell of the wings is deeper, while the outer cross vein is strongly bent and perpendicular to the sixth vein; and the submarginal cell is much shorter, more nearly equilateral.

Empis azteca Wheeler et Melander (Fig. 119).

Biol. Cent. Am., Dipt. Suppl., Nov., 1901, p. 369.

Female.—Black. Head thickly grayish-pollinose, the ocellar spot in some reflections showing black. Face shining black below, gray-pollinose below the antennæ. Antennæ black, longer than the head; third joint gently tapering, as long as the first; style minute. Proboscis and labella reddish yellow, black at the base, altogether about as long as the thorax. Thorax opaque gray, variable in color in different reflections; pile erect, black; margin of the scutellum with a row of long hairs. Legs yellow, with black hairs; femora, except the tip, black; last joint of all the tarsi brown or black. Wings uniformly yellowish brown; anterior branch of the third vein very short, rectangular; fourth vein arched back, distant from the third at the tip; penultimate section of the fifth vein unusually short, not twice the length of the anterior cross-vein; discal cell small. Halteres black, with yellow peduncles. Abdomen thickly gray-pollinose, the second and third segments wholly shining black. Front metatarsi dilated and darker than the second to the fourth tarsal joints. 6 mm.

Guerrero, Mexico (Smith).

Empis pegasus Osten Sacken.

Biol. Cent. Am., Dipt. 1882 ~~Suppl.~~, p. 216.

Female.—Black; front moderately broad, opaque; face shining. Antennæ black; third joint not longer than the first, triangular, slightly excised on the underside, the arista as long, or a little longer. Thorax black, with a trace of three grayish stripes. Abdomen with the four basal segments ochraceous yellow, opaque, shining on the incisures only; the last segments black, shining. Legs dark brown or black; femora, tibiæ and tarsi beset with broad fringes of scale-like hairs (on the anterior femora alone the fringes are replaced by hairs); the four hinder femora and the tibiæ distinctly flattened. Wings with a uniform brown tinge; the branch of the third vein slightly oblique. 7 mm.

Volcan de Chirique, Panama, Central America.

Empis xochitl Wheeler et Melander (Fig. 118).

Biol. Cent. Am., Dipt. Suppl., Nov. 1901, p. 370.

Female.—Robust, dull, opaque-black throughout, the only lighter portions being the piceous proboscis, the base of the halteres and the subhyaline wings. Front of uniform moderate breadth. First antennal joint short, second still shorter, the third slightly longer than the other two together; arista forming a continuation of the third joint, stout. Proboscis twice as long as the eye-height. Margin of the first abdominal segment fringed with black bristles, which are stronger laterally. Legs not ciliated, though the longer hairs are serially arranged on the underside of the femora and on the inner and outer sides of the tibiæ; front metatarsi slightly compressed. Wings almost hyaline; no stigmal spot; anterior branch of the third vein obliquely disposed; anal vein attaining the margin. 4 to 5 mm.

Guerrero, Mexico (Smith).

Empis totipennis Bellardi.

Mem. d. Reale Accad. d. Scienze d. Torino, Ser. 2, vol. xxi, p. 199.

Female.—Black cinereous. Antennæ black. Proboscis equal to the head and thorax together. Halteres black, paler towards the base. Legs black-brown; front femora more or less ciliated on the inside; middle and hind femora and all the tibiæ on the inner and outer sides with long, regular cilia; all the tarsi tomentose and spinose, not ciliated. Wings wholly fuliginous, the duskiness darker at the stigma; first submarginal vein arcuate, subsinuose; first posterior vein not reaching the margin of the wing. 5 mm.

Morelia, Mexico (Saussure).

Empis spiloptera Wiedemann.

Empis spiloptera Wiedemann, Auss. Zw., ii, 5, 10.
Empis picta Loew, Cent. iii, 28.

Male.—Head black, occiput cinerascent. Eyes contiguous along the front. Antennæ black, moderate, third joint acuminate, the terminal style rather long. Palpi black. Proboscis badious, exceeding twice the length of the head, labium deeply bipartite. Thorax and scutellum black cinereous, black-pilose. Abdomen dark brown, moderately shining, black-pilose; hypopygium rather large, subglobose, closed, the upper lamellæ short, dark badious, the central filament hidden. Coxæ piceous. Femora pale testaceous, at the very apex spotted with a black dot; the anterior tibiæ testaceous at base, piceous towards apex; hind tibiæ piceous, the base, however, testaceous; tarsi piceous, the very base of each joint testaceous; the whole of the legs clothed with long black hair. Knob of halteres infuscated. Wings pale fuscous, the veins a little more dusky fuscous, the apex of the second longitudinal vein recurved, the anterior branch of the third vein ascending perpendicularly, the fourth vein abbreviated and furcate by an adventitious branch below before the apex; stigma oval, fuscous; the cross-veins, the adventitious branch of the fourth vein, and the costa between the branches of the third vein bordered with fuscous; discal cell broad. 4.2 mm.

Mexico.

Empis clausa Coquillett (Fig. 129).

Proc. Nat. Mus., 1895, p. 401.

Male.—Head black, subshining, eyes contiguous, upper facets larger than the lower ones; antennæ black, the third joint quite short, rather broad at the base; style two-thirds as long as the third joint; proboscis two and one-half to four times as long as the height of the head, palpi brown. Thorax, pleura and scutellum black, opaque, gray pollinose, pile in front of the halteres black; scutellum bearing two bristles. Abdomen black, subshining, towards the base more or less tinged with yellow, its pile black; hypopygium very small, porrect; filament slender, yellow, hidden, except on the basal half. Legs slender, simple, the middle and hind femora and all the tibiæ furnished with much very long black pile; coxæ yellow, the hind ones brown; femora yellow, the hind ones, except at base, blackish; tibiæ and tarsi blackish, extreme base of each tibia yellowish; hind tibiæ greatly dilated towards the tip, bowing inwardly at the middle; front metatarsi nearly twice as thick as the middle ones, hind metatarsi nearly as thick and slightly longer than the front ones. Knob of halteres blackish. Wings hyaline. stigma and a front border to the anterior branch of the third vein and on the small and posterior cross-veins dark brown; veins brown, fourth vein obliterated before reaching the wing margin, anterior branch of the third vein usually ending in the second vein, closing the first submarginal cell; contact of discal and fourth posterior cells much longer than that of the third and fourth posterior cells.

Female.—Differs from the male in that the legs are wholly brown, compressed, and that the upper and under sides of all the femora, outer and inner sides of all the tibiæ, and the upper sides of the front and hind metatarsi ciliate with long, nearly erect scales. Base of abdomen never winged with yellow. 4 mm.

Illinois (Robertson).

This species is common throughout the western part of the United States.

At first reading this may seem to be the same as *E. spiloptera*, but it is quite different, as Mr. S. W. Henshaw tells me, in the coloration and venation; although these two characters are capable of great variation in this species.

Empis asema sp. nov. (Fig. 130).

Male and Female. Length 4 mm.—Black, gray pollinose, somewhat shining. Head small, occiput gray pollinose, black-bristly; eyes broadly contiguous in the male, and widely separated in the female, facets large above, small below (male), and uniform (female); antennæ moderate, slender, black, first joint rather short, the second joint as long as the first, third joint one and one-half times the length of the first two, broad at the base, suddenly narrowed to mid-way its length, then nearly uniform to the tip, arista three-fourths the length of the third joint; proboscis black, slender, over twice as long as the height of the head; palpi small, slender, black. Thorax shining, sparsely gray-coated, disc with several short black bristles and margined with a few longer ones, scutellum with two apical bristles; pleuræ less shining, and more closely pollinose, the row of black bristles in front of the halteres consisting of about seven. Abdomen subshining, gray pollinose, a little darker than the thoracic notum, rather long and slender, cylindrical in the male, and short, depressed in the female, not conspicuously bristly, its few hairs black; hypopygium closed, subcompressed, small, with several short black hairs, filament yellow, exposed at the base, not thick. Legs short, robust, of the male the coxæ have small bunches of fine black hairs on the anterior side, the femora and tibiæ are regularly ciliate, with long slender black hairs beneath, otherwise hairy, and with a few black slender bristles on the upper side of the middle and hind tibiæ and tarsi; the front metatarsi flattened, broad, nearly as long as the remainder of the tarsus, the next three joints of the front tarsi globose, densely black-bristly, the last joint slender, short, flattened; middle legs slender; hind legs rather stout, the metatarsi stout, three times as thick and one-half again as long as the middle ones. Of the female the coxal hairs, those of the under side of the front femora, of both edges of the other femora and of both edges of all the tibiæ assume a flattened scale-like character, much pronounced on the posterior legs; tarsi slender, hind metatarsi but little thicker than the middle ones. Halteres infuscated. Wings hyaline, distinctly infumated, broad, rounded, basal cells short, the fourth vein not reaching the margin, anterior branch of the third vein slightly curved, obliquely ascending, outer edge of the discal cell deeply angulate, a distinct bristle present at the base of the costa.

One male, three females. May; Austin, Texas.

Empis labiata Loew.

Cent. i, 33.

Male.—Eyes contiguous. Proboscis long, slender; labium very slender, the labellæ filiform, equal to the stipes. Palpi yellow. Antennæ black. Thorax cinerascent with sparse pollen, moderately shining. Hypopygium moderate, porrect, black; the lower lamellæ incurved, with short pubescence and paler towards the apex. Legs black or dark brown, long, slender, with black pile and bristles, all the metatarsi lengthened. Halteres fuscous or blackish, the knob pale above. Wings brownish black, the stigma and veins more dusky; the third longitudinal vein thick, reaching the margin a little before the extreme apex of the wing, its anterior branch ascending straight to the margin; the fourth vein incomplete.

Female.—The apex of the wing broader than in the male, the third longitudinal vein extending further past the apex of the wing; the discal cell a little larger; the legs with short pile, but the posterior femora and tibiæ with scales on both sides. 3 mm. or larger.

District of Columbia (Osten Sacken).

Empis distans Loew (Fig. 127).

Cent. viii, 54.

Female.—Black. Antennæ black, slender, rather long. Proboscis black, labrum testaceous towards the apex, reaching the middle coxæ, labellæ linear. Thorax blackish gray, opaque, provided with faint black vittæ and sparse black pile; the pile in front of the halteres long, black. Abdomen purer black, shining, with very short black pile. Legs slender, almost black; anterior tibiæ, except the base, and the middle and hind femora on both sides pennate, the middle and hind tibiæ above likewise pennate, below ciliate with ordinary, very short hairs. Halteres dusky yellow, almost fuscous. Wings blackish, the costal and marginal cells darker, veins black; the third longitudinal vein thicker than the others, far distant from the costa, to which it sends an almost perpendicular branch, so that the second submarginal cell forms an equilateral triangle; discal cell rather large; the fourth longitudinal becoming more slender from the base of the discal cell, and slightly reflexed towards the tip. 3.3 mm.

Georgia (Poeppig, Berlin Museum). Numerous specimens from Connecticut and Louisiana.

The male has a small gaping hypopygium which is higher than the abdomen, central filament slender, bowed, the tip concealed, middle lamellæ rather large, the right one terminated by a peculiar downward-hanging membranous appendage, upper lamellæ inflexed. Legs not pennate, but sparsely bristly, the bristles becoming long on the outer edge of the hind tibiæ, middle metatarsi as long as their tibiæ, tarsi not spinose below.

Empis dolorosa Wheeler et Melander (Fig. 128).

Biol. Cent. Am., Dipt. Suppl., Nov., 1901, p. 370.

Male.—Black. Eyes closely contiguous, with an acute angular emargination on each side of the face above. Face shining black. Antennæ black, about as long as the head; second joint more than half the length of the first; third joint longer than the first two together, narrowed on the distal half or more; style slender, about half as long as the third joint. Proboscis black, as long as the head and thorax together. Mesonotum very slightly dusted with white, shining; hair and bristles not abundant, black. Pleuræ whitish-pollinose. Four anterior femora and the middle tibiæ and tarsi luteous-yellow; front tibiæ and tarsi and the hind legs darker brown or blackish; metatarsi not dilated; legs provided with rather sparse hairs. Wings somewhat broad, varying from brownish to hyaline, with an elongated inconspicuous brown stigma; discal cell short; the penultimate section of the fifth vein much shorter than the ultimate section; furcation of the third vein acute; fourth vein abbreviated, not reaching the margin. Knob of halteres black. Abdomen scarcely shining. Hypopygium small, filament yellow, thick, with its tip concealed. 5 mm.

Guerrero, Mexico (Smith).

Empis triangula Coquillett.

Proc. Wash. Acad. Sci., 1901, p. 410.

Black, the halteres and legs dark brown, knees yellow, this color rarely extending over the greater portion of the femora and sometimes of the tibiæ, venter of abdomen of female largely yellow; eyes of male contiguous, third joint of antennæ nearly linear, at least five times as long as broad, the style scarcely perceptible; proboscis from one and one-half to twice as long as height of head; hairs and bristles of thorax and scutellum black; thorax somewhat polished, very thinly gray pruinose, not distinctly vittate, scutellum bearing ten marginal bristles; abdomen slightly polished, hypopygium rather large, obliquely ascending, the lower piece bearing a cluster of rather long, black bristles at its apex, filament hidden, venter of abdomen destitute of processes and of spinous bristles; legs simple, slender, almost bare; wings hyaline, veins and stigma brown, second submarginal cell somewhat triangular, pointed at its base, about one and one-half times as long as broad, discal cell subequal in length to last section of fourth vein, last section of fifth vein half as long as the preceding section. 2-3.5 mm.

British Columbia; Alaska: Tip of Last Vegas Range (Hudsonian Zone), New Mexico (T. D. A. Cockerell).

Empis cormus Walker.

List Dipt. Ins., iii, p. 496.

Black (male), or cinereous (female). Lip, eyes and feelers black; chest of the female adorned with three indistinct hoary stripes; hind borders of the abdominal segments of the female hoary; legs black; knees tawny; shanks and feet piceous; wings colorless, rather broad; wing-ribs and veins piceous, the latter strongly marked; poisers piceous. 4 mm.

Hudson's Bay, St. Martin's Falls, Albany River (Barnston).

A mutilated specimen from Colorado may belong here.

Empis luctuosa Kirby.

Empis luctuosa Kirby, N. A. Zool. Ins., 311, 2.

Empis geniculata Kirby, ibid.

Body entirely black. Proboscis very little longer than the head; wings a little embrowned, with a large black stigma, irridescent, nervures black. Length of body including wings 6 mm.

British America.

E. geniculata Kirby.—Almost black. Wings slightly embrowned, beautifully irridescent; legs, where the shank is united to the thigh, white. Proboscis nearly as long as the thorax. Length 6 mm.

British America.

The synonymy is Mr. Coquillett's, and likewise the introduction of the species into the analytical table is done on Mr. Coquillett's authority for the number of scutellar bristles.

Empis gulosa Coquillett.

Proc. Nat. Mus., 1895, p. 408.

Female.—Head black, bluish gray pollinose; antennæ black, third joint broad at the base, rapidly tapering toward the apex, style slender, more than one-half as long as the third joint; proboscis one-half longer than the height of the head, palpi brown. Thorax black, opaque gray pollinose, marked with four dark brownish vittæ; its very sparse pile black; pleura black, bluish gray pollinose, pile in front of the halteres black; scutellum black, grayish pollinose, bearing four bristles. Abdomen black, opaque brownish pollinose, that on the hind and lateral margins of the segments light gray; on the hind margin of the first three segments toward the sides is a fringe of rather long black bristles, most developed on the second segment. Legs slender, simple, yellow, including the coxæ; tarsi towards the apex brown; femora destitute of long bristles; middle metatarsi slightly thicker, but shorter than the front ones; hind metatarsi much thicker than the middle ones, subequal in length to the front ones. Knob of the halteres yellowish white. Wings grayish, stigma nearly obsolete, veins dark brown, no long bristles on the costa near its base. 7 mm.

Illinois (Robertson).

Empis humile Coquillett.

Proc. Nat. Mus., 1895, p. 403.

Male.—Head black, gray pollinose, except on oral margin; eyes separated a shorter distance than the width of the lower ocellus, facets of a uniform size; antennæ having the two basal joints brownish yellow, the third black, rather narrow, gradually tapering to the tip, style over one-half as long as the third joint; proboscis from two to three times as long as the height of the head, palpi light yellow. Thorax, pleura and scutellum black, opaque grayish pollinose, the rather long pile of thorax and scutellum black; thorax with two blackish vittæ, scutellum bearing four bristles. Abdomen black, shining, the pile rather long and abundant, black; hypopygium large, lamellæ largely yellow, middle ones oblong, slightly tapering to tip, not longer than the broad upper ones; filament slender, almost bristle-like, arcuate. Legs simple, rather robust; coxæ black, femora brownish yellow, lighter yellow at the base, tibiæ and tarsi light yellow, tarsi brownish towards apex; middle and hind legs provided with rather long, stout, black bristles; front and hind metatarsi subequal in size, the middle metatarsi considerably more slender and only two-thirds as long as either of these. Knob of halteres yellow. Wings brownish gray, costal cell and border to some of the veins yellowish; stigma and veins brown.

Female.—Same as the male, with these exceptions: prothorax, the lateral margins of the thorax, the scutellum, metanotum, pleura and abdomen yellowish, a black spot above the middle and hind coxæ, a transverse one on the lower part of the metanotum and sometimes a brownish fascia near or on the hind margin of each abdominal segment except the first. Coxæ and legs yellow, hind metatarsi much thicker than the front ones. 7 mm.

Illinois (Robertson).

Empis pœciloptera Loew.

Cent. i, 31.

Female.—Yellow, black-pilose. Head yellow. Proboscis yellow, about equal to twice the length of the head. Antennæ long, slender, yellow, the upper margin and the apex of the third joint black. Thorax opaque. Abdomen shining. Legs long, slender, pale yellow, the apex of the tarsi black. Halteres yellow. Wings long, subcinerascent, with a luteous tinge, veins fuscous, the transverse veins bordered with fuscous; the anterior branch of the third vein joined with the second vein by a cross-vein. 4.1 mm.

New York (Edwards).

Empis longipes Loew.

Cent. v, 51.

Male.—Slender, rather bare, yellowish, darker above. Head black, cinereous with whitish pollen. Front very narrow. Antennæ very slender, black, the terminal style moderate. Proboscis about equal to the first two joints of the front tarsi taken together. Thorax lutescent; the dorsum cinereous, opaque, with four narrow fuscous vittæ, the middle ones abbreviated posteriorly, the outer ones much shortened anteriorly, provided with very sparse black bristles and short hair. Scutellum lutescent. Abdomen luteous, shining, with a median vitta on the posterior blackish margins of each segment. Hypopygium moderate, yellow, open, the apex with black hairs, the central filament very thick, concolorous, hidden beyond the base. Legs long, slender, yellow, with short black pile, tarsi piceous, the first joints apically, the others wholly black. Wings yellowish cinereous, veins brownish yellow, stigma concolorous, nearly wanting. 5.5 mm.

New York, Lake George (Osten Sacken).

One female, Alleghany, Pennsylvania, differs from Loew's description of the male as follows:

Basal joints of the antennæ fuscous; the third a little longer than the other two together, its style moderately thick, one-half the length of the third joint; proboscis longer than the hind femora, fulvous on the basal half above; no median vitta on the greatly shining abdominal segments, which are distinctly margined with black posteriorly and laterally; hind trochanters beneath and tip of the femora narrowly black. The outer branch of the third vein is obtusely angulate at its middle, the basal angle of the second submarginal cell being about 70 degrees.

Empis sordida Loew.

Cent. iii, 29.

Male.—Pale tawny, opaque. Head cinereous. Proboscis shorter than twice the length of the head. Basal two joints of the antennæ fuscous, the outer black. Eyes separated. Dorsum of the thorax with four fuscous vittæ, provided with short black pile. Abdomen pale yellow, shining, the base of each segment fuscous. Hypopygium concolorous, small, clavate, closed, the middle lamellæ ascending, oblong-ovate, with very short pubescence. Coxæ pale testaceous, black pilose. Legs long, slender, testaceous, black pilose; apex of the tibiæ fuscous; anterior tarsi black, except the base; the last joint of the posterior tarsi black. Halteres yellowish. Wings long, subhyaline, cinerascent, faintly tinged with fuscous, stigma obsolete, veins fuscous. 3.5 mm.

District of Columbia (Osten Sacken).

Empis abcirus Walker.

List Dipt. Ins., iii, p. 494.

Male.—Fulvous, hoary. Head hoary, thinly clothed beneath with black hairs; hypostoma black; lip tawny for more than half its length, black thence to the tip, nearly as long as the body; eyes bright red; feelers black; first and second joints dark tawny; chest and breast hoary with a tawny tinge; chest adorned with four gray stripes, between which are rows of short black bristles; the hinder border of the chest is beset with longer black bristles; abdomen black shining; legs tawny, beset with short black hairs and bristles; hips black; feet piceous towards the tips; foot-cushions and claws tawny; wings colorless; wing-ribs and poisers bright tawny; veins piceous, tawny towards the base and along the fore borders. 5 mm.

Georgia (Abbot).

Empis eudamidas Walker.

List Dipt. Ins., iii, p. 493.

Male.—Fulvous, head cinereous, narrower than the thorax, clothed with short black hairs; eyes red; mouth tawny, with a black tip, as long as the chest; feelers tawny, black towards their tips, longer than the head; chest paler on each side, beset with short black hairs, adorned on the back with four gray stripes; abdomen fulvous, apically black; legs tawny, clothed with short black hairs; hips and trochanters gray; knees black; tips of the feet piceous; a short black stripe on each of the four front thighs; wings nearly colorless, tawny towards the base. 6 mm.

Empis amytis Walker.

List Dipt. Ins., iii, p. 493.

Male.—Fulvous. Head black, much narrower than the chest; eyes dark red; mouth tawny, with a black tip, much shorter than the chest; feelers black; chest and breast tawny; disc of the former black; abdomen black, dull, tawny along each side; legs tawny, clothed with short black hairs; knees and tips of feet black; wings colorless; wing-ribs and poisers tawny; veins piceous, tawny towards the base. 5 mm.

New York.

Empis ollius Walker.

List Dipt. Ins., iii, p. 493.

Female.—Fulvous. Head gray, thinly coated beneath with black hairs; hypostoma black, shining; lip dark tawny, piceous at the tip, shorter than the body; eyes bright red; feelers black; chest and breast dull tawny; chest adorned with four brown stripes, between which are rows of short black bristles; the hinder part of the chest is beset with longer black bristles; abdomen black, shining, legs tawny, beset with short black hairs and bristles; hips black; feet piceous towards the tips; wings slightly tawny; wing ribs and poisers bright tawny; veins piceous, tawny towards the base and along the fore borders. 4 mm.

Nova Scotia.

Empis laniventris Escholtz.

Wiedemann, Aussereurop. Zweifl. Ins., 2, p. 6.

Fuscous; head black; thorax in front and abdomen with yellow hair. Head below wholly bare; occiput with long black hairs. Eyes brown. Antennæ black, the first two joints with hairs at their tips only. Proboscis black; palpi yellow. Thorax grayish brown, with brown hairs on the dorsum, on the pleuræ with longer yellow hairs. Scutellum grayish brown, with a few black bristles. Pectus grayish brown, with no hairs. Abdomen above dark brown, with fine black pubescence; venter in the middle and plainly on the sides with long, dense yellow hairs. Wings much longer than the body, somewhat yellowish, with brown veins, those nearest the costa wholly yellow; the anterior branch of the third vein strongly arcuate. Knob of the halteres yellow, the pedicel brown. Legs reddish brown, with piceous tarsi, with fine black hairs; hind tibiæ bowed; femora scarcely thicker than the tibiæ. 8 mm.

Alaska. Bering Isl.

Empis colonica Walker.

List Dipt. Ins., iii, p. 498.

Body bright tawny, shining, smooth, beset with a few slender short black bristles; eyes and feelers black; lip tawny piceous towards the tip, much more than half the length of the body; abdomen dark tawny, thinly clothed with short black hairs and bristles; feet piceous towards the tips; wings with a tawny tinge; wing-ribs tawny; veins brown, tawny towards the base; poisers pale yellow. 6 mm.

Nova Scotia (Redman).

Empis leptogastra Loew.

Cent. iii, 30.

Female.—Slender, yellow, shining, rather bare. Head black, face and front very narrow, concolorous; antennæ slender, elongate, the third joint black, the preceding fuscous. Proboscis slightly longer than the head, slender, yellow. Dorsum of the thorax divided by a longitudinal black median vitta. Abdomen marked with a basal black fascia on each segment, united by a black line, the last segment black altogether. Legs with sparse fine pile, slender, the hind femora thickened towards the apex and bearing black spines below; the apex and a median ring of the hind femora, the apical third of the hind tibiæ and all the tarsi black. Knob of the halteres infuscated. Wings rather long and narrow, cinereous hyaline, veins piceous, the third vein slightly incurved apically, the anterior branch ascending perpendicularly. 4.5 mm.

District of Columbia (Osten Sacken).

Empis armipes Loew.

Cent. i, 32.

Male.—Yellow, with short black pile. Eyes distant. Proboscis yellow, longer than the head. Palpi yellow. First two joints of the antennæ yellowish brown, the third joint black, long, strongly attenuate from the broad base, the terminal style long. Thorax opaque, a single fuscous vitta, abbreviated from each side and sometimes obsolete. Abdomen shining, fuscous, the side and hind margins of each segment yellow. Venter yellow. Hypopygium small, porrect, the middle and lower lamellæ yellow; the central filament almost concealed. Legs long, slender, yellow, the tarsi from the apex of the first joint almost black; the posterior legs with the femora armed with some very obtuse spines, a part large and black-pilose, the others smaller and bare. Halteres yellow. Wings long, brownish gray, the faint stigma a little more brown, veins fuscous.

Female.—Very much like the male; the posterior legs simple; the pile of the tibiæ and tarsi shorter and sparser than in the male. 5 mm.

New York.

Empis tridentata Coquillett (Fig. 132).

Proc. U. S. Nat. Mus., vol. xxiii, p. 609.

Head black, gray pruinose, front of male at narrowest point less than the width of the lowest ocellus; antennæ black, the first two joints yellow, the third slightly over four times as long as wide, gradually tapering to the apex, nearly four times as long as the style, palpi and proboscis yellow, the latter almost twice as long as the height of the head; thorax yellow, a large black, gray pruinose spot in the middle of the hind part of the mesonotum; sending three prongs toward the head, the median one subopaque, the lateral ones polished, three small black spots beneath the insertion of each wing, and a fourth bordering the mesothoracic spiracle and prolonged backward almost to the wing, hairs and bristles of thorax black, scutellum yellow, the base of the middle black, bearing four bristles; abdomen polished, yellow, bases of segments two to four or five usually black, most extended in the female, central filament of male hypopygium very sinuose; legs yellow, apices of tarsi brown, middle and hind femora beset with spinous bristles on the under side; wings hyaline, stigma brown, a brown cloud on the base of upper branch of third vein, another on vein at base of second posterior cell, and one above forking of second and third veins. 6 mm.

Pennsylvania (C. W. Johnson).

Empis pallida Loew.

Cent. i, 30.

Male.—Wholly yellow. Head concolorous. Eyes separated. Proboscis much longer than the head. Antennæ long, slender, first two joints yellow, third, except the base, black, with a slender terminal style. Thorax opaque, sparsely black-pilose. Abdomen shining, covered with rather long yellowish pile. Hypopygium small, clavate, the median lamellæ oblong-ovate, ascending, with short pile. Coxæ yellow, with black pile. Legs long, slender, yellow, with black pile; last joint of the tarsi wholly, the others apically black. Halteres yellow. Wings large, hyaline, pale cinerascent, with a yellowish tinge, stigma pale yellow, almost wanting, veins yellow. 4 mm.

New York (Edwards).

Empis rufescens Loew (Fig. 120).

Cent. v, 52.

Male.—Yellow, reddish above. Thorax subopaque, abdomen shining. Head black, cinereous with whitish pollen. Eyes narrowly separated on the front. Antennæ moderate, rather stout, the first two joints red, the third black, the terminal style moderate. Proboscis yellow, longer than the front tibiæ. Dorsum of the thorax provided with a few black hairs and bristles. Hypopygium yellow, rather long, ascending, closed, the lower lamellæ long, the upper small, short-ovate, the central filament exserted, low, slender, curved, yellow. Legs slender, clothed with short black hairs and setulæ, yellow, the first two tarsal joints apically and the other three wholly black. Wings cinereous with a yellowish tinge, veins fuscous, becoming luteous towards the costa and base, stigma very pale, subfuscous. 6.1 mm.

New Hampshire (Osten Sacken). Massachusetts (Hough).

Empis rubida Wheeler et Melander (Fig. 121).

Biol. Cent. Am., Dipt. Suppl., p. 368, Nov., 1901.

Female.—Front and face shining black. Antennæ reddish yellow; third joint slender on the distal part, the style slender, aristiform. Proboscis yellow, not longer than the head. Mesonotum shining, yellowish red, strongly convex; bare; pleuræ yellower. Abdomen brownish yellow. Legs light yellow, not dilated or ciliated; tip of all the metatarsi and the remaining tarsal joints, the tips of the hind femora and tibiæ blackish. Wings cinereous hyaline, with yellowish veins; stigma elongate, brown; anterior branch of the third vein nearly rectangular and gently arcuated. Halteres yellow. 4 mm.

Guerrero, Mexico (Smith).

Empis otiosa Coquillett (Fig. 122).

Proc. Nat. Mus., 1895, p. 407.

Male.—Head black, gray pollinose, eyes separated as widely as the posterior ocelli, facets of a uniform size; antennæ black, third joint two and one-half times as long as the first, rather narrow, style one-third as long as the third joint; proboscis two and one-half times as long as the height of the head, palpi yellow. Thorax black, opaque gray pollinose, marked with two darker vittæ, its sparse pile and bristles black; pleura black, gray pollinose, its pile black; scutellum gray pollinose, bearing four bristles. Abdomen black, depressed, except towards apex, subshining, its pile rather abundant and long, black; hypopygium rather small, middle lamella longer than the upper, rounded on the lower side; filament rather slender, yellow. Legs simple, very robust, femora nearly twice as thick as their tibiæ, hind femora one-third longer than the middle ones; coxæ black, femora dark brown, yellowish at base and apex, the hind ones sometimes wholly yellowish, tibiæ and tarsi light yellow, apex of the latter brown; front metatarsi unusually large, nearly twice as long and as thick as the middle ones, one-half thicker and one-third longer than the hind ones. Knob of halteres light yellow. Wings hyaline, stigma pale brownish, veins dark brown.

Female.—Same as the male, except that the tibiæ and tarsi are darker, the yellow being replaced with reddish; the femora are usually reddish and are more slender; the hind ones are nearly twice as long as the middle ones; front metatarsi more slender and one-half longer than the middle ones, also more slender and slightly longer than the hind ones; wings grayish brown. 6-7 mm.

Illinois, Connecticut; Massachusetts, New Hampshire, Kansas, Louisiana.

Empis Johnsoni sp. nov. (Fig. 123).

Male and Female. Length 6 mm.—Black, head and thorax closely covered with grayish tomentum, the gray color with a slight brown tinge. Eyes maroon color, of the male contiguous for two-thirds the distance between the front ocellus and the antennæ; of the female the eyes are separated more widely than the posterior ocelli; face short, broad, cinereous-dusted, oral border shining black, cheeks obliterated, mouth-opening large; palpi short, extending straight forward, but not surpassing the oral border, luteous, with a slender black subapical bristle; proboscis slender, extending to the tip of the middle coxæ, yellow above, black below; antennæ shorter than the head-height (male), or subequal to it (female), first two joints short, fuscous, the third elongate, lanceolate, black, blunt at the tip in the female, the arista one-half the length of the third joint in the male, or more slender and only one-third the length in the female; occiput cinereous, its black bristles in two rows, moderately bristly below. Thorax cinereous, dorsum with two narrow darker stripes, and two broader posteriorly placed lateral ones; between the median and lateral vittæ a distinct series of black bristles, humeri with a bunch of hairs, dorsum margined with about eight prominent macrochætæ on each side, scutellum with four long marginal, and no short bristles, the row in front of the halteres dense, with about fifteen bristles, no other pleural bristles, pectus with a few scattered short bristles. Abdomen depressed, shining, very faintly cinereous toward the base in the female and opaque jet black in the male on the basal four segments, which are rather densely provided with long black marginal hairs; hypopygium shining, compressed, rather large, distinct, porrect, central filament yellow, slender, arcuate, largely visible, middle lamellæ large, pointed, porrect, fulvous on the lower side, upper lamellæ small, bipartite, fulvous, except the darkened upper edge. Coxæ black, faintly slaty-gray pollinose, with numerous black bristles, remainder of the legs fuscous, becoming darker on the outer half of the tarsi; legs slender, unarmed, hind femora below with evident spines, legs with numerous bristles and short black hairs; pulvilli and claws of male large. Halteres fuscous. Wings subhyaline, with a brownish tinge, stigma almost obsolete, veins strong brown, third vein furcate beyond the tip of the marginal cell, the anterior branch arises acutely, the posterior branch terminates just before the extreme wing-tip, first submarginal cell narrower than the first posterior cell, sixth vein recurved at the tip, costa with a strong bristle at its base.

Four specimens; Montgomery County, Pennsylvania (C. W. Johnson).

Empis enodis sp. nov. (Fig. 125).

Male and Female. Length 6-8 mm.—Almost bare species of moderate stature. Black, cinerascent with olivaceous gray. Head cinerascent, eyes wine color, separated at their narrowest part in the male as widely as the posterior ocelli, in the female a trifle more; palpi very small, reddish; proboscis once and one-half to two times the height of the head, black above, reddish below, labella black; antennæ black, slender, as long as the head, second joint one-half the length of the first, first and second joints with sparse hairs, third joint lanceolate, somewhat blunt in the female, arista one-third the length of the third joint; the strong bristles of the occiput in two rows. Thorax brownish gray cinereous, the brown more evident on the dorsum, with four broad brown vittæ, the intervittal spaces with short hairs, those of the median series minute, a few long marginal macrochætæ on the dorsum; scutellum with four to six marginal bristles of uneven length, the central pair longest; metapleural row consisting of about five closely placed nearly uniform bristles; prothoracic series small, no pectal or other pleural bristles. Abdomen concolorous with the pleuræ, devoid of long hairs, almost glabrous, except towards the tip, with strong bristles near the incisures; hypopygium small, not extending above the abdomen, closed, central filament hidden, or sometimes the trumpet-shaped tip more or less exposed, middle lamellæ small, rounded, fulvous, upper lamellæ small, nearly hidden. Coxæ cinerascent, apically more or less fuscous, provided with a few bristles, those of middle and hind legs in series, trochanters with a minute black spot; legs simple, fuscous, femora narrowly tipped with black, tarsi black, legs with small bristles, becoming short and dense on the hind tibiæ of the male, and on the under side of all the tarsi of both sexes, and long on the tibiæ, sparsely so on the front and middle ones, and more numerous on the hind ones of the male; none of the metatarsi or tibiæ thickened; pulvilli minute. Halteres reddish. Wings hyaline, with a smoky tinge, no stigmal spot; veins strong, dark fuscous, discal cell rather deep, the first section of its anterior border one-fourth the length of the second section; the furcation of the third vein even with the tip of the marginal cell, the posterior branch terminates beyond the tip of the wing.

Glen Ellyn and Chicago, Illinois.

Empis stenoptera Loew.

Cent. v, 50.

Slender, almost glabrous, opaque, whitish cinerascent, abdomen of female less whitish. Head concolorous. Eyes of the male separated. Antennæ very slender, black. Proboscis black, longer than the head, but shorter than the anterior femora. Dorsum of the thorax quadrivittate with subfuscous, the median vittæ abbreviated posteriorly, the outer anteriorly. Hypopygium of the male closed, black, the lower lamellæ testaceous, the central filament hidden. Coxæ whitish cinerascent, pale yellowish apically. Legs slender, fuscous, the base of the femora, and the base of the tibiæ broadly below, yellow, the tibiæ towards the tip and all the tarsi black. Halteres pale yellowish. Wings narrow, cinereo-hyaline, stigma obsolete, veins fuscous. 4 mm.

New Hampshire (Osten Sacken).

Empis cacuminifer sp. nov. (Fig. 124).

Male and Female. Length 6 mm.—Dusky opaque species. Head, pleuræ, metanotum and large part of the abdomen dark plumbeous gray-pollinose; thoracic dorsum broadly quadrivittate with brown. Palpi fuscous, without hairs; proboscis one and one-half times the head-height or less, dark reddish, the labella shorter than the proboscis. Antennæ as long as the head, slender, black, the first joint twice as long as the second, the third joint not quite three times the length of the first, lanceolate, its arista one-third its length; eyes separated a little more widely than the posterior ocelli in the male, and a little more in the female; bristles of the occiput irregularly placed. The intervittal bristles of the thorax minute, the marginal macrochætæ short, no long humeral macrochæta; scutellum with two long and two short marginal bristles; three or four bristles in the vertical row in front of the halteres; bristles of the pronotal collar minute, no pectal bristles present. Abdomen dull grayish, with a piceous tinge, wholly opaque, the hind margins of the segments cinereous; hypopygium moderate in size, closed, central filament rather stout, nearly straight on the exposed basal part, fuscous, shining, middle lamellæ concealing the remainder of the hypopygium, dark fuscous. Legs stout, dark fuscous, including the coxæ, tarsi blackish; coxæ sparsely black-bristly, more evidently bristly in front; tip of trochanter and of femora narrowly black; hind femora slightly bowed on the proximal third; hind trochanters of the male widened within and produced as a prominent tubercle, which is capped by a dense pencil of black bristles, remainder of the legs without sexual armament; hind femora not reaching the end of the abdomen, as long as or shorter than their tibiæ; front metatarsi of the male a little stouter than those of the female, tarsi densely spinose beneath; bristles of the legs prominent, especially in the male, pubescence not marked. Halteres reddish yellow. Wings hyaline, with a faint brown tinge, veins fuscous, stigma obsolete, third vein furcate opposite the end of the marginal cell, the posterior branch terminates at the wing apex; discal cell moderate, the first section of its fore margin one-fifth the length of the second section, no prominent costal bristle.

Numerous specimens from Ohio (J. S. Hine), and Alabama (C. F. Baker).

Empis nuda Loew (Fig. 126).

Cent. ii, 20.

Male.—Pale cinereous, opaque, almost glabrous. Eyes distant. Antennæ elongate, slender, black. Proboscis moderate. Thoracic dorsum almost bare, with very sparse black bristles and four fuscous vittæ, the middle vittæ abbreviated posteriorly, the outer on both sides. Pleuræ cinereous, bare, except for two black bristles in front of the halteres. Abdomen fusco-cinereous, the hind margins of each segment grayish white. Hypopygium small, yellowish, with sparse black pile, the lamellæ oblong-ovate, the base of the central filament very thick, the apex hidden. Coxæ pale yellow, the anterior bare, except for a few apical setæ. Legs slender, darker yellow; the tarsi and a very narrow apical ring on the hind femora almost black, the base of the tarsi and the apex of the tibiæ paler fuscous; the hind trochanters armed with small black spines below; the black pile of the femora very short, of the middle tibiæ longer, of the hind tibiæ long above. Wings cinerascent, the obsolete stigma pale subfuscous, veins strong fuscous. 6 mm.

Illinois (Le Baron).

The following remarks, based on further specimens also from Illinois, may be of service in the identification of this species.

Eyes separted in the case of the male as widely as the width of the anterior ocellus. The occipital bristles short, arranged in two rows. All the intervittal spaces provided with sparse minute bristles arranged longitudinally. The row in front of the halteres consists most generally of three bristles. Scutellum with two bristles. The abdomen is slightly shining through the sparse coating. The hind femora possess a single short spine-like bristle at the beginning of the outer third of the lower surface; front metatarsi as thick as the outer part of the tibia, and nearly as long as the three following joints. Halteres pale yellow. Stigma wanting, the third vein acutely branched at the tip of the marginal cell, its anterior branch scarcely two thirds the length of the posterior branch, which ends at the extreme wing tip; the proximal section of the vein bounding the discal cell anteriorly scarcely one third the length of the second section.

The female differs from the male in that the eyes are separated a little more widely, the posterior trochanters lack the pencil and are not explanate, the hairs of the legs are all short and evidently bristle-like, and the front metatarsi are slender.

Empis compta Coquillett.

Proc. Nat. Mus., 1895, p. 405.

Female.—Head black, gray pollinose; two basal joints of antennæ brown, the third black, narrow, elongate, style one-sixth as long as the third joint; proboscis over twice as long as the height of the head, palpi brown. Thorax and pleura black, opaque gray pollinose, thorax marked with four blackish brown vittæ; pile in front of halteres black; scutellum blackish, its apex brown, bearing four bristles. Abdomen on base of segments yellowish brown, on apex broadly yellow, seventh and eighth segments and the two anal lamellæ wholly brown; pile of abdomen sparse, yellowish, no fringe of long black bristles on the hind margin of any of the segments. Legs slender, destitute of a fringe of scales, yellow, including the coxæ; tarsi toward the apex brown; metatarsi of nearly an equal thickness, the hind ones slightly longer than the others. Knob of halteres light yellow. Wings hyaline, stigma wanting, veins light brown, no stout bristle on costa near its base (first marginal cell closed in one wing, broadly open in the other). 3.5 mm.

Illinois (Robertson).

Male.—Beyond the fifth abdominal segment the abdomen is suddenly bent downward, the seventh dorsal segment convex, small; hypopygium moderately large, hanging downward, almost cylindrical, tubular, the lamellæ porrect, moderately prominent, yellowish, the central filament reddish, hidden within the tube. Legs slender, unarmed, the hind femora beneath and the tibiæ outwardly with a few slender, black longer hairs. Wings slender, rather pointed, the first submarginal cell open, the anterior branch of the third vein bent, extending acutely.

Opelousas, Louisiana, March.

Empis varipes Loew.

Cent. i, 34.

Male and Female.—Hunch-backed. Head, thorax and scutellum cinereous, opaque. Proboscis longer than the head, luteous, stripes of the labium black. First two joints of the antennæ dark brown, the third black. Thorax black-pilose. Abdomen black, very shining, sparsely provided with very fine pale pile, the base and venter luteous. Hypopygium of the male very small, dipping down, black, the central filament low and slightly curved. Front coxæ luteous, the others grayish brown. Legs luteous, a very broad subapical ring on the posterior femora black, a very broad subbasal ring on the hind tibiæ fuscous, sometimes wanting, the apex of all the tibiæ fuscous; all the femora below with small black spines. Halteres white. Wings of the male longer than those of the female, whitish, veins concolorous, but the second section of the costa and the apex of the third longitudinal blackish; wings of the female pure hyaline, not whitish, with a very faint cinerascent tint, veins fuscous. 3 mm.

Pennsylvania (Osten Sacken).

Empis levicula Coquillett.

Proc. Nat. Mus., 1895, p. 406.

Male. Head black, bluish gray pollinose, eyes contiguous; antennæ black, the two basal joints yellow, style over one-half as long as the third joint; proboscis yellowish, black at the apex, over three times as long as the height of the head, palpi yellow. Thorax, pleura and scutellum black, opaque gray pollinose; thorax with four brown vittæ, its sparse pile and bristles black; pile of pleura white, scutellum bearing four bristles, the two outer very short. Abdomen black, opaque brown pollinose, its sparse pile white; hypopygium small, the filament hidden. Legs slender, destitute of long bristles, dark yellowish, including the coxæ; the tarsi toward the apex black; front metatarsi nearly as long, but only about half as thick as the hind ones. Wings whitish hyaline, veins brownish, stigma wanting. Halteres yellow.

Female.—Same as the male, except that the thorax and abdomen are wholly bluish white pollinose. 6–7 mm.

Illinois (Robertson).

Empis avida Coquillett.

Proc. Nat. Mus., 1895, p. 405.

Female.—Head black, bluish gray pollinose; antennæ brown on the two basal joints, the third joint black, short, broad, tapering gradually to the tip, style over one-half as long as the third joint; proboscis three times as long as the height of the head, palpi yellow. Thorax, pleura and scutellum black, opaque, bluish gray pollinose; thorax marked with four blackish brown vittæ, its pile rather dense, but quite short, black; pile in front of halteres white, abundant, fine; scutellum bearing four bristles. Abdomen black, opaque, light bluish gray pollinose, its pile white, that on sides near the base abundant, long; no fringe of long black bristles near the hind margins of any of the segments. Legs slender, simple, femora destitute of long bristles; coxæ brownish yellow, the hind ones largely blackish; femora, tibiæ and tarsi brownish yellow, apices of tarsal joints and last joint wholly blackish; middle metatarsi scarcely thicker than the front ones, hind metatarsi nearly twice as thick but scarcely longer than the front ones. Knob of halteres yellowish white. Wings grayish hyaline, stigma and veins dark brown, no long bristle on costa near its base. 7 mm.

Illinois (Robertson).

Empis comantis Coquillett.

Proc. Nat. Mus., 1895, p. 402.

Male.—Black; apex of palpi, proboscis, except the base and the lower lip, femora, except a large portion of the under side, tibiæ and tarsi, except at apex, yellowish red. First antennal joint twice as long as the second; the third one and one-half times as long as the first; style slender, as long as the third joint; frontal triangle naked; eyes narrowly separated; proboscis three times as long as the height of the head. Thorax opaque gray pollinose, marked with four blackish vittæ, thickly white and black pilose, the bristles black; pile at each end of pleura, on coxæ and abdomen mixed black and white; that on venter and sides of abdomen abundant, white. Scutellum white pollinose, and bearing twelve marginal black bristles. Abdomen shining, nearly destitute of pollen; hypopygium large, ascending; central filament largely yellow, double, free, arcuate. Legs simple, femora thickened, the hind ones over twice as thick as their tibiæ; pile and bristles of femora rather numerous and long. Wings slightly brownish, stigma and a spot above base of second vein, dark brown, anterior branch of third vein very oblique and much curved. 9 mm.

Northern California (O. T. Baron).

The knobs of the halteres are black.

Empis brachysoma Coquillett.

Proc. Wash. Acad., 1901, p. 409.

Black, the palpi, horny portion of proboscis, stems of halteres, femora and tibiæ yellow, front and hind femora in both sexes and hind tibiæ in the male, yellowish brown, coxæ brown basally, changing into yellow at their apices, tarsi and knobs of halteres dark brown, apex of male abdomen marked with yellow; eyes of male contiguous, third joint of antennæ rather broad at base, quite rapidly tapering to the apex, about twice as long as the style, proboscis twice as long as height of head; hairs and bristles of mesonotum black, hairs of pleura and abdomen white; thorax opaque, gray pruinose, mesonotum marked with four slightly polished, black vittæ, scutellum bearing from four to six black bristles; abdomen of male polished black in middle of dorsum, the sides opaque, gray pruinose; in the female the dorsum of segments two to four, and all of abdomen beyond fifth segment polished black, remainder of abdomen opaque, gray pruinose; hypopygium of male rather small, obliquely ascending, claspers destitute of processes, dorsal piece with a broad emargination in the posterior end almost reaching its center, central filament hidden, venter destitute of processes and of spinous bristles; legs of male simple, femora destitute of bristles and long hairs; first joint of hind tarsi noticeably thicker than that of the front ones; legs of female ciliate with nearly erect scales on both sides of the hind femora and tibiæ, middle femora, and apical half of upper side of the front femora; wings unusually long and narrow, grayish hyaline, stigma and veins, except at base of wing, dark brown, venation normal. 7 mm.

Alaska.

Empis obesa Loew.

Cent. i, 28.

Male.—Cinereous, opaque. Eyes contiguous. Proboscis slender, nearly equal to the body. Palpi yellow. Antennæ black. Dorsum of the thorax with four black vittæ covered with fine whitish hairs and a little longer plack pile. Margin of the scutellum with black bristles. Abdomen white-pilose. Hypopygium large, swollen, ascending; lamellæ obtuse at apex, the upper wholly badious; the central filament high and very thick. Coxæ cinereous, badious at the very tip, clothed with pale hairs and a few black bristles. Legs slender, simple, badious, black-pilose; anterior tibiæ apically and the posterior all but the base dark brown; tarsi black. Halteres luteous. Wings infuscated, veins and stigma dark fuscous, the discal cell moderate, the anterior branch of the third vein very oblique. 3 mm.

Massachusetts (Scudder).

Empis Aldrichii sp. nov. (Fig. 110).

Male. Length 7.5 mm.—Head and thorax black, gray pollinose, abdomen fulvous or partly black. Front and face gray pollinose; eyes separated as widely as the width of the anterior ocellus, facets small, of uniform size; face of even breadth, sides of the front rounded inwardly, anterior oral margin black, shining; occiput gray pollinose, black-bristly above, the bristles arranged as a postocular row and scattered beyond this, with fine hairs intermixed; on the lower occiput the hairs are white; proboscis three times the length of the head. fulvous, the labella black; palpi ribbon-like, pale lemon-yellow, rectangularly bent at their middle; antennæ as long as the face and front together, slender, the first two joints yellowish, the third black, the second joint one-half the length of the first, the third joint as long as the first and second united, gradually acuminate, with a rather slender style one-third its length; not conspicuously hairy. Thorax gray pollinose, the pollen without any bluish tinge, but merging towards olive-brown instead; tip of the humeral callosity red, shining, subhumeral spiracle large, yellow; on the middle of the pectus above each of the front coxæ is a conspicuous rosette of yellowish hairs, in front of the halteres is a row of many fine yellowish hairs; dorsum of the thorax opaque brown-gray pollinose, provided with four chocolate-brown broad vittæ, the middle pair abbreviated posteriorly on the concave portion of the mesonotum, the outer pair abbreviated anteriorly; humeri with a few short blackish bristles, sparser on the notum, intervittal spaces provided with scattered short, fine yellowish hairs, the margin of the notum with several black bristles, scutellum with four marginal bristles, an extra pair of small ones present rarely; the intervittal black bristles become longer in front of the scutellum. Abdomen robust, as long as the head and thorax united, cylindrical, not shining (or at least but little shining on the rubbed parts), closely covered with pollen, gray basally, becoming fulvous on the remainder of the abdomen, the segments rather conspicuously provided with luteous hairs; the ground color of the abdomen is piceous, with the posterior margins of the segments flavescent, the last ventral segment larger, black, dusted or not, provided with a few apical black spurs on the right side; hypopygium robust, more or less spherical, yellowish red, its parts distinct, the filament curved, stout, partly clasped near its middle by the inferior triangular lamellæ. Legs moderate, simple, reddish yellow; coxæ grayish basally, with whitish hairs on the antero-exterior side, trochanters with a faint blackish spot below near the tip; femora a little thickened; metatarsi about equal in thickness. slender, front and hind ones of the same length, middle ones a little shorter; last tarsal joint blackish; legs clothed with very fine, dense, short, pale pubescence and with short blackish hairs, longer on the under edge of the femora. Halteres large, yellowish. Wings large, full, dark, no stigma present, anterior branch of the third vein curved, oblique, no large costal bristle.

Two males; Moscow, Idaho, and Mt. Hood, Oregon.

This species differs structurally from *E. ravida* Coquillett in the larger hypopygium, thickened femora, slender tibiæ and tarsi, separation of the eyes, and the chætotaxy, especially of the scutellum, hind femora and coxæ.

Empis ravida Coquillett (Fig. 111).

Proc. Nat. Mus., 1895, p. 403.

Male.—Black, the palpi and halteres yellow, the proboscis, except the lower lip, hypopygium, coxæ (largely or wholly), femora, tibiæ and tarsi, reddish yellow. Eyes contiguous, frontal triangle bare. First antennal joint two and one-half times as long as the second, the third joint one and a half times as long as the first, sublanceolate, the style rather slender, nearly half as long as the third joint. Proboscis twice as long as the height of the head. Thorax opaque, gray pollinose, marked with four brownish black vittæ, the shorter pile whitish, the longer pile and the bristles black. Pile on each end of the pleura, on coxæ, venter and sides of abdomen whitish; middle and hind coxæ bearing black bristles. Scutellum bearing six to eight black bristles. Abdomen opaque, white pollinose, the short pile of the dorsum black. Hypopygium moderately large, obliquely ascending, the central filament not disengaged; no projections on venter in front of the hypopygium; coxæ and legs simple, femora destitute of stout spines below, the bristles very short; wings dark gray, stigma much elongated, dark brown, anterior branch of the third vein oblique and curved.

Female.—Same as the male with these exceptions: eyes widely separated; abdominal segments beyond the fifth shining; apical half of the under side of the hind femora ciliate with rather short scales and spines. 6–8 mm.

New Hampshire (Coquillett); Georgia, Idaho.

Empis captus Coquillett.

Proc. Nat. Mus., 1895, p. 405.

Male.—Differs from the male of *Empis ravida* only as follows: first two antennal joints reddish; first joint only slightly longer than the second, the third three times as long as the first, tapering very gradually to the apex; scutellum bearing only two bristles; dorsum of abdomen brownish pollinose. Hypopygium very large, the filament robust, disengaged, arcuate, compressed and dilated near the apex; on base of upper side of each upper lamella is a low wart-like process, and just outside of this is a backwardly projecting fleshy process bearing on the middle of its under side a backwardly directed black spine whose tip is even with that of the process from which it springs; below this process is a second, yellow fleshy, upwardly directed process. Wings hyaline.

Female.—Differs from the male in that the proboscis varies from two to four times the head-height; femora and tibiæ of middle and hind legs ciliate on each side with rather short, black scales and bristles, the scales sparsest on the middle tibiæ. 5–7 mm.

North Carolina and Georgia.

Empis tersa Coquillett.

Proc. Nat. Mus., 1895, p. 404.

Male.—Differs from the male of *Empis ravida* only as follows: abdomen shining reddish yellow; coxæ, femora and tibiæ lighter yellowish; first antennal joint twice as long as the second, the third joint twice as long as the first; proboscis three times as long as the height of the head; thorax destitute of whitish pile, that on each side of the pleura black, each coxa bearing several black bristles; pile and long bristles of abdomen and venter wholly black. Scutellum bearing four bristles. Abdomen shining, destitute of pollen. Hypopygium small, porrect; the central filament free, filiform, arcuate. Bristles of middle and hind femora rather long.

Female.—Differs from the male in that the proboscis is six times as long as the height of the head, when bent backward almost reaching the tip of the abdomen. 6 mm.

North Carolina.

Empis tenebrosa Coquillett.

Proc. Nat. Mus., 1895, p. 404.

Male.—Differs from the female of *Empis ravida* only as follows: eyes as widely separated as the posterior ocelli. First two antennal joints reddish, the first scarcely longer than the second, the third twice as long as the first. Entire pile of the thorax, pleura, coxæ, venter and abdomen black. All the femora robust, twice as thick as their tibiæ, the middle and hind ones bearing numerous, rather long bristles on their under side. 6 mm.

Texas.

Empis spectabilis Loew (Fig. 109).

Cent. ii, 21.

Female.—Gray, opaque, with short black pile. Head cinereous. Length of the proboscis nearly twice that of the head. Palpi yellow. Antennæ long, the first two joints dark badious and black-pilose, the third joint black, its apical style stout. Thorax quadrivittate with fuscous, the side vittæ much abbreviated. Coxæ reddish, cinerascent towards the base, black-pilose. Legs rufous, the extreme apex of the femora and the apex of each tarsal joint black, the last tarsal joint wholly black; the hind femora moderately thickened, the middle and hind femora with small black spines below. Halteres yellowish. Wings brownish red, the costal cell ochraceous, veins dark brown, stigma lighter fuscous; discal cell short; anterior branch of the third vein erect. 7 mm.

Maryland (Osten Sacken). Delaware Co., Pennsylvania.

Male.—The hairs of the under side of the palpi are long; the antennal style is not more than one-fifth the length of the third joint; the thoracic vittæ are narrow; the hairs on the base of the costa become longer, with two or three on each side bristle-like. Abdomen stout, deflexed at the tip, the fifth dorsal segment large, convex, provided with a prominent lateral reddish umbo, beneath this the venter is much constricted, the fourth ventral segment large, terminating in a flat transverse bifid process, the fifth and sixth ventrals small, crowded into the constriction, the seventh ventral moderately large; hypopygium small, the central filament thick, its base exposed, middle lamellæ quadrilateral, truncate at the tip, yellowish.

Clementon, New Jersey.

The male has eight long scutellar bristles, the female but four. The eyes of the male are narrowly separated by the front so that they nearly touch (vide Coquillett, Empidæ, p. 398, group 23).

It is to the group of the four following species that *Empimorpha barbata* belongs.

Empis lævigata Loew.

Cent. v, 49.

Male.—Wholly black, shining, black pilose. Eyes contiguous. Antennæ slender, black. Proboscis black, partly fuscous above, longer than the anterior tibiæ. Dorsum of thorax black-pilose, very finely covered with cinerascent pollen. Scutellum convex, bare, except for six marginal bristles. Pleuræ and coxæ cinereo-pollinose, subopaque. Hypopygium deflexed, closed, the central filament hidden. In front of the hypopygium the venter has two incurved apophyses bearded with black pile. Legs simple, slender, clothed with short hairs and fine black bristles. Knob of halteres flavescent. Wings pale subfuscous, the stigma subfuscous, veins fuscous. 7.5 mm.

New Hampshire (Osten Sacken).

Empis virgata Coquillett (Fig. 108).

Proc. Nat. Mus., 1895, p. 408.

Male.—Black in all its parts, except the whitish knob of the halteres and the pulvilli; all pile and bristles also black. Eyes separated by an interval narrower than the lowest ocellus; third joint of the antennæ sublanceolate; the style nearly one-fourth as long as the joint. Proboscis slightly over twice as long as the height of the head. Thorax subshining, lightly gray pollinose and marked with three shining black vittæ; pleura grayish black pollinose, scutellum shining, bare, except the six marginal bristles and a few marginal hairs. Abdomen depressed, shining; hypopygium rather small, central filament hidden; on the under side of the fifth segment is a large, ovoid process, extending the entire length of the segment, its posterior end rather thickly beset with short, stout black bristles. Legs slender, front metatarsi one-half thicker and one-half longer than the middle ones, noticeably longer and thicker than the hind ones. Wings pale brown, stigma darker brown, all the veins perfect. 8 mm.

Washington (O. B. Johnson); British Columbia, Alaska.

Empis pellucida Coquillett.

Proc. Wash. Acad. Sci., 1900, p. 408.

Black, the palpi and horny part of proboscis, except at base, yellow, halteres yellowish white, bases of tibiæ sometimes reddish yellow; eyes of male more widely separated than the posterior ocelli; third joint of antennæ rather broad, gradually tapering to the apex, about five times as long as the style, proboscis twice as long as the height of the head; hairs and bristles of body and legs black; mesonotum slightly polished, marked with a median, light gray pruinose vitta, the lateral margins and pleura gray pruinose; scutellum bearing four bristles; abdomen highly polished. hypopygium of male small, almost bare, obliquely ascending, destitute of elongate processes, central filament robust, rapidly tapering to the apex, arcuate, free, except its apex; hind margin of fifth abdominal segment ventrally fringed with spinous bristles, many of which are as long as this segment; legs in both sexes simple, first joint of hind tarsi slightly thicker than that of the front ones, hind femora spinose on the under side; wings hyaline, veins dark brown, normal, stigma brown. 6 mm.

Alaska.

Closely related to *virgata* Coquillett, but in that species the spinous bristles on the ventral portion of the fifth abdominal segment in the male are arranged in a round cluster, and none of them exceed one fourth the length of this segment; both sexes have the mesonotum dark gray pruinose and marked with three distinct, polished black vittæ.

Empis fumida Coquillett.

Proc. Wash. Acad. Sci., 1900, p. 409.

Differs from the above description of *pellucida* only as follows: Palpi and proboscis black, legs always wholly black, eyes of male less widely separated than width of lowest ocellus, mesonotum highly polished, not distinctly vittate, scutellum bearing six or more bristles, hypopygium quite thickly covered with hairs, the central filament hidden, except, sometimes, its apical portion, wings pale brown, more yellowish at base and in costal cell. 7 mm.

Alaska.

It is with hesitation that I have included this, the following, and even the preceding species in the same group with *virgata.* In more than one case has Mr. Coquillett arranged a series of species the description of one of which depends upon the foregoing, until at last a form is reached in no wise related to the first species, but which depends on the first description for its recognition. In the present instance *pellucida* depends on *virgata*, *fumida* on *pellucida*, and *infumata* on *fumida*, but in no case but the first is mention made of the peculiar and very conspicuous ventral process of the males.

Empis infumata Coquillett.

Proc. Wash. Acad. Sci., 1900, p. 409.

Same as *fumida*, except that the palpi and horny parts of the proboscis are yellow, central filament of hypopygium of male free, except at the apex, no fringe nor cluster of spinous bristles on ventral portion of the fifth or other abdominal segments, hind femora destitute of spinous bristles on the under side, at most with a few weak bristles on the apical fourth. 5 mm.

Alaska.

Empis cæligena sp. nov. (Fig. 107).

Male.—Ground color black, silvery gray pollinose. Eyes wine color, contiguous for about one-third of the distance between the antennæ and the ocelli, facets uniformly small; palpi pale fuscous, short, extending straight forward, with numerous long black hairs below, proboscis not twice the head-height in length, slender, reddish at the base, black apically; antennæ a little longer than the head-height, black, first and second joints short, provided with black hairs, second joint one-half the length of the first, third joint slender, beyond the basal fourth of almost equal thickness, blunt at the tip, the arista small, one-eighth as long as the third joint; occiput cinereous, with numerous black hairs indistinctly, irregularly arranged in three transverse rows, the lower occiput bare in the middle. Thorax gray dusted, not at all tinged with brown, the usual four vittæ of the dorsum black, not brown, broadly bordering the two outer vittæ are rather long hairs, the marginal bristles of the dorsum not markedly thicker than the other hairs, humeri with rather long hairs, pronotal collar consisting of short hairs, above the base of each coxa is a small bunch of hairs, the prehalteral row consisting of twelve hairs, scutellum with about twelve marginal bristles. Abdomen short, robust, deflected at the tip, with silvery-gray pollen, not silky in lustre, with long fine hairs, especially noticeable on the sides of the basal segments; antepenultimate ventral segment with a short, broad, median bifurcate process, lateral to which the posterior margin of the segment is emarginate, sixth ventral segment small, hidden by the fifth and the last; hypopygium small, but robust, closed, middle lamellæ large, almost cordiform with the emargination above, enveloping nearly the whole of the hypopygium, upper lamellæ small, central filament completely hidden. Coxæ black, cinereous, paler apically, front and middle ones with numerous fine black hairs on the forward side, hind ones with a few long hairs on the inner and outer sides; legs simple, fuscous, extreme tip of the femora and the tarsi darker, tarsi almost black; legs wholly covered with long and rather dense black hairs, short, dense and almost bristle-like on the plantar surface of the tarsi, femora stout, but not thickened, hind ones reaching beyond the end of the abdomen, hind tibiæ slightly thicker than their femora, the other tibiæ more slender; metatarsi not thickened, front ones as long as the two following joints, middle ones equal to the next, hind ones somewhat shorter, than the next two joints; pulvilli grayish, not enlarged. Halteres pale yellow. Wings hyaline, with a faint brownish tinge, stigma nearly obsolete, veins strong, fuscous; discal cell short, broad, the first section of the fourth vein bounding it anteriorly, but slightly less than two-thirds the length of the second section; furcation of the third vein takes place beyond the end of the marginal cell, the posterior branch ending just in advance of the extreme wing-tip; twice the length of the anterior branch; two rather long bristles present near the base of the costa.

Female.—The female differs from the male in the following characters: eyes separated nearly twice as widely as the posterior ocelli; scutellum generally with eight bristles; abdomen more flattened, tip not deflected, color of the abdomen more yellowish gray; the hairs of the legs much reduced, those of the underside of the femora more evidently bristle-like; tibiæ not as thick as the femora; only one long costal bristle near the base of the wing. 5.5 mm.

Alabama (C. F. Baker).

Empis teres sp. nov. (Figs. 133–142).

Male and Female. Length 4–5 mm.—Black; silvery gray pollinose (female less silvery). Occiput, front and face gray pollinose; eyes maroon color, facets uniformly small, eyes of the male separated the width of the front ocellus, the front of the female broader; palpi short, slender, not exceeding the mouth-opening, pale yellow; proboscis once and one-half the eye-height, slender yellowish; antennæ slender, as long as the eye-height, first joint moderately long, first and second fuscous, third joint black, as long as the first two together, arista one-third the length of the third joint; bristles of the occiput arranged in two definite rows. Thorax dusted with silvery gray in the male, female with a slightly brownish tinge to the notum, dorsum with indications of four darker vittæ, the outer two abbreviated in front, and very faint, the intervittal spaces with sparse short black bristles, but few humeral and marginal bristles, the series in front of the halteres indefinitely consisting of about five bristles, of which only two are long; scutellum with from four to six marginal bristles, generally with two well-separated median and two short outer bristles; pectus devoid of bristles. Abdomen sparsely hairy, dull grayish in the female, silky white pollinose in the male, ground color of the narrow posterior margins of the individual segments whitish; hypopygium compressed, narrow, gaping, the central filament slender, strongly bowed, hidden at the very tip, the lamellæ extending obliquely upward, lightly dusted, middle lamellæ emarginate above, the upper lamellæ not deeply but broadly excised above. Coxæ and legs yellowish, the tips of the trochanters and of the femora narrowly black, the black hairs of the legs not dense, in the male the hairs are long, especially on the outer portions, tarsi and more or less of the tip of the tibiæ darkened; legs of the female simple and slender, of the male slender, but the tip of the hind femora beneath with three subterminal small tubercles in longitudinal series, the proximal globose, the middle one a little toward the inner side, truncate and bounded outwardly by a distinct black spine, the third medially placed and bounded both inwardly and outwardly by a row of black bristles, the outside row being of greater extent; corresponding with the femoral tubercles the base of the tibia is peculiarly dentate, the three basal teeth evident and each tipped with a black spine, beyond the teeth the under edge of the tibia is serrulate and ciliate with short black hairs; the hairs of the outer edge of the tibiæ and tarsi long, tarsi of both male and female beneath with short thick black bristles, metatarsi about equal to the next three tarsal joints, the front metatarsi of the female and the middle metatarsi of the male are, however, shorter, the hind metatarsi of the female and the fore and hind ones of the male are as thick as the tips of the tibiæ. Halteres pale yellow. Wings clear hyaline, veins narrow fuscous, stigma obsolete, the third vein stronger than the others, furcate before the tip of the marginal cell, the furcation acute, the anterior branch straight, the posterior branch terminating in the wing-margin slightly beyond the tip; first submarginal cell broader than the marginal, about as broad as the first posterior cell; sixth vein evanescent toward its apex; no strong costal bristles present.

Nineteen specimens; Idaho (J. M. Aldrich).

Empis loripedis Coquillett (Fig. 131).

Proc. Nat. Mus., 1895, p. 400.

Male.—Head black, gray pollinose; eyes separated as widely as the posterior ocelli, facets of a uniform size; antennæ black, third joint somewhat over twice as long as the first, slender, tapering gradually to the middle, thence of an equal breadth; style nearly one-third as long as the third joint; proboscis one and one-half times as long as the height of the head, palpi yellow. Thorax black, opaque gray pollinose, marked with four dark brownish vittæ, almost destitute of pile, the bristles black; pleura black, sometimes partly yellowish, bluish gray pollinose, pile in front of halteres black; scutellum black, gray pollinose, bearing two bristles. Abdomen compressed, shining, black; the broad hind margin of each segment laterally yellow, sometimes extending to the anterior edges of the segment. dividing the black color into three vittæ, medio-dorsal and lateral; pile of abdomen sparse, black; venter yellow; hypopygium rather large, ascending, abundantly black-pilose, middle lamellæ yellow, broadening to the tip; filament very thick at base, then suddenly attenuated and bristle-like, arcuate. Legs, including the coxæ, light yellow; apical half of front tibiæ and extreme apex of the others, front tarsi wholly, apex of the first two joints and the whole of the remaining joints on the middle and hind tarsi, usually but not always a dark brown; all the tibiæ and tarsi furnished with numerous long black pile; on the under side of each hind femur before its apex is an irregular, three-pronged process, and on the inner side of each hind tibia near its base are two processes, one behind the other; just before the basal process the tibia is hollowed out; front metatarsi nearly twice as long and three times as thick as the middle ones, hind metatarsi one-half thicker and one-third longer than the middle ones. Knob of halteres light yellow. Wings dark gray, stigma slightly darker, vein dark brown. 6–7 mm.

Female.—Like the male, except that the hind femora and tibiæ are destitute of processes, the front metatarsi are not thicker than the middle ones, while the hind metatarsi are much thicker than and fully as long as the front ones; abdomen tapering to the apex.

Illinois and Ohio.

Empis gladiator sp. nov. (Fig. 134).

Male and Female.—Length 6-7 mm.—Rather slender, more or less yellow species. Head black, cinereous, occiput somewhat conically formed; eyes wine-red, separated a little more widely than the posterior ocelli, which are, however, rather close together, facets small, uniform; palpi slender, yellow, with very few short hairs; proboscis one and one-half times the head-height, yellowish, the extreme tip darkened, the labella fleshy, fulvous, reaching down one-half the length of the proboscis in the male and to the tip in the female; antennæ slender, as long as the head-height, the first two joints dark fuscous, provided with a few short hairs, the first joint over twice as long as the second, the third joint twice as long as the first, glabrous, lanceolate, somewhat blunt in the female, black, the arista two-thirds the length of the third joint; bristles of the occiput in two rows. Mesonotum normally with brownish gray dust over a black ground, sometimes the covering effaced, when the thoracic disc is highly polished, marked with four brown, conspicuous, rather broad vittæ, the outer two abbreviated in front; the intervittal spaces with a few minute bristles, margin of the notum with four macrochætæ, one on the humerus, one supra-alar, one on the post-alar ridge and one in front of this; scutellum with two marginal macrochætæ; the humeri, pectus, post-alar ridge, margin of the scutellum, sides of the metanotum and the pleuræ largely yellowish, dusted with cinereous; the ground color of the pleuræ darkened above the base of the four posterior coxæ and in front of the root of the wings; bristles of the pronotal collar slender, sparse, of the metapleural row about three in number. Abdomen shining, yellowish, with an indistinctly limited median blackish stripe; the segments with a subapical series of long slender black bristles, the hairs of the abdomen sparse and minute; hypopygium comparatively long, vertical, yellowish, not densely provided with hair, nearly closed, but its parts visible, central filament slender, curved, exposed, except near the tip, the middle lamellæ erect, their posterior margin inflected, the apical corner with a deep emargination; the upper lamellæ relatively small, with dense, fine hairs; styles of the female reddish. Coxæ yellow, all provided with few black hairs on the front surface near the tip; trochanters and tip of femora with the usual small black spots; legs yellow, except the more or less brownish tarsi, rather slender, the hind femora not surpassing the abdomen and not longer than the tibiæ; none of the metatarsi thickened, the front ones as long as the next three joints, the hind ones somewhat shorter, the middle metatarsi as long as the two succeeding joints; the last four tarsal joints with a double series of spinose hairs; legs clothed with short black hairs, longest distally and conspicuous on the hind legs of the male; trochanters simple; the hind femora of the male swollen on the outer third, provided with a subapical median tubercle on the under side, which is tipped with a slender black spine curved towards the end of the femur, on a line with this, but on the infero-exterior edge, is a short fringe of black bristles, on the outer under edge, opposite the fringe, is a scoop-shaped triangular dilatation of the femur, with a subapical emargination on the hind edge; these processes articulate with structures near the base of the tibia, the median spine of the femur corresponding with an elongate blunt tubercle, into the emargination of the femoral scoop fits a small tooth which is provided on the outer side with a small fringe of black bristles; the apex of the hind femora provided with a series of bristles above, and narrowed as in the angulate basal part of the tibia; legs of the female simple, not thickened. Halteres pale yellow. Wings slender, long, hyaline, with a faint brownish tinge, no stigmal spot present; the furcation of the third vein, which takes place opposite the end of the marginal cell, the posterior branch ending beyond the wing-tip; discal cell rather small, the proximal section of the vein bounding it anteriorly one-fourth the length of the second section, no long costal bristles present.

Numerous specimens of both sexes. Lawrence, Kansas (Dr. S. W. Williston).

Empis arthritica sp. nov. (Figs. 135, 144).

Male and Female. Length 5 mm.—Slender, pale gray pollinose. Eyes of the male separated as widely as the length of the second antennal joint, in the female somewhat more, facets uniformly small; palpi small, pale yellow, with but one minute subapical black hair; proboscis about twice the height of the head, reddish, labella as long as the proboscis, pale yellow; antennæ slender, black, about as long as the head-height, the first joint two times as long as the second, the third joint nearly three times the length of the first, slender, lanceolate, not sharp at the tip, arista scarcely longer than the second antennal joint; occiput black, cinereous-pollinose, its bristles small, in two transverse rows. Thorax light gray pollinose, the dorsum quadrivittate with brownish, the intervittal bristles very sparse and minute; one large humeral bristle present, the marginal macrochætæ three in number; in front of the halteres two small and one minute bristles, the scutellum with two central small and two outer minute bristles; no pectal bristles, pronotal series minute; the ground color of the pectus, the humeral callosities, edge of the scutellum, and two pleural spots above the middle and hind coxæ more or less yellowish. Abdomen shining, glabrous, except for a few short submarginal bristles, yellowish; hypopygium yellow, moderately small, compressed, nearly vertical, nearly closed, central filament thickened at the base, curved, exposed, except the tip, middle lamellæ comparatively small, convex, excised at the tip, the upper lamellæ small, exposed. Legs including the coxæ yellow, trochanters and femora tipped with a small black spot, the tarsi brownish apically; legs slender, the hind femora reaching or surpassing the end of the abdomen; all the metatarsi about as long as the two following joints, the front ones of the male a little longer, nearly as thick as the tibiæ but not appearing swollen, the tarsi spinose beneath, pulvilli minute, yellowish; trochanters simple; hind knees of the male armed, the femora gradually but slightly thickened distally, at the distal fourth on the outer inferior edge with a small tubercle capped by a pencil of black bristles, beyond which is a series of five scattered bristles, the inner inferior corner is explanate into a concave plate which is excised proximally to a spur and carina, the tibia exceedingly thin at its angular base, then suddenly swollen inwardly and produced as a strong bristly process which articulates into the concavity of the femoral plate, the outer edge of the abrupt tibial swelling deeply excised to receive the incurved femoral spur. Halteres pale yellow. Wings narrow, nearly hyaline, no stigmal darkening, veins fine, dark fuscous, the third vein furcate slightly in advance of the end of the marginal cell, its posterior branch terminating slightly beyond the wing-tip; the first section of the anterior border of the discal cell one-fourth the length of the second section, the discal cell narrow; first and second posterior cells of equal width at the base; costa destitute of long bristles.

Montgomery Co., Pennsylvania (C. W. Johnson).

Empis podagra sp. nov.

Male and Female. Length 6 mm.—Black, more or less coated with cinereous pollen. Eyes separated as widely as the distant posterior ocelli, facets uniform, small. Palpi black, sparsely bristly toward the tip; proboscis wholly black, about one and one-half times the head-height. Occipital bristles dense, in two rows. Thorax wholly cinereous, marked with four brown mesonotal vittæ which are as wide as the intervittæ; intervittal bristles minute, sparse; scutellum with four bristles, the central pair widely separated; six fine hairs in the metapleural row. Abdomen slender, black, the male abdomen is shining above, excepting the first and half of the second segments, abdomen of the female sparsely dusted; hypopygium shining, black, terminal, not large, upper lamellæ visible one-third as large as the oblong middle lamellæ, both densely hairy, central filament moderately slender, strongly arcuate, basal part exposed. Coxæ cinereous, trochanters black; legs short, femora brown, piceous apically, hind ones reaching the fifth abdominal segment, tibiæ piceous, black apically, tarsi black; of the male the hind femora are provided with a long sharp bristly projection just beyond the middle of the outer under side, between this and the tip of the femur with a small median mammiform tubercle, the apical fourth of the outer under edge is fringed with sparse bristles commencing in a dense pencil, the apical eighth of the inner under edge is provided with a dense fringe; the hind tibiæ of the male suddenly swollen near the knee to a flat prominence tipped with a long black pencil, diagonally across from this is a swollen tubercle provided with a black brush on its flattened top, the hind tibiæ densely bristly; hind metatarsi thickened, and of the male the front ones likewise, the hind ones of less diameter than their tibiæ, the front ones of greater diameter, tarsi densely spinose below. Halteres yellow. Wings hyaline, with a faint cinereous tinge, stigmal spot elongate, the furcation of the third vein slightly before the tip of the marginal cell, the vein between the first basal and the discal cells shorter than that between the second basal and the discal cells, and one-fourth the length of the second section of the anterior border of the discal cell; anal vein thin.

Three males and two females; Juliaetta and Peck, Idaho. From Prof. J. M. Aldrich.

Empis mira Bigot.

Enoplempis mira Bigot, Bull. Soc. ent. France, 1880, p. 47.

Enoplempis Bigot.—Hind femora robust; below, at the tip, strongly armed and unidentate, the tibiæ below at the base similarly mucronate and unidentate, the teeth with small hairs, thick.

E. mira. Male.—Fulvo-testaceous; the apex of the antennæ, the proboscis above, five vittæ of the thorax, the lateral ones interrupted, fusco-canous; wings yellowish. 6 mm.

California.

Empis Bigoti nom. nov.

Enoplempis cinerea Bigot, Bull. Soc. Ent. Fr., 1882, p. 91.

Cinereous, antennæ fuscous; front cinereous; thorax with four castaneous vittæ; incisures of the abdomen fuscous; balteres testaceous; trochanters infuscated; legs fulvous; femora, the apex of the tibiæ and the tarsi fuscous, posterior tibiæ infuscated over all; wings subhyaline, with a scarcely perceptible, elongate, very slender fuscous stigma. 6 mm.

California.

In addition to this the generic characters may be added, as given under *E. mira* Bigot.

In as much as Mr. Coquillett has recognized "what is evidently this species" it seems unjust to Mr. Bigot that "as the name *Empis cinerea* is preoccupied for a European species, Bigot's description of *Enoplempis cinerea* should be cancelled." It is better to adopt a more general precedent, so hereafter the species may be known as *E. Bigoti.*

Empis manca Coquillett.

Proc. Nat. Mus., 1895, p. 406.

Male.—Head black, gray pollinose, eyes separated the width of the lowest ocellus, facets of a uniform size; antennæ black, third joint narrow, elongate, style one-third as long as the third joint; proboscis one and one-half times as long as height of head, palpi yellow. Thorax black, opaque, gray pollinose, marked with four black pollinose vittæ, its sparse pile and bristles black; pleura black, light gray pollinose, its pile black; scutellum black, gray pollinose, bearing four black bristles. Abdomen dark brown, hind margin of each segment whitish, opaque whitish pollinose, its pile or bristles along the hind margins of the segments long, black; hypopygium yellowish brown, very large, erect, its pile black; central filament very robust, arcuate, free except towards the apex, its extreme tip dilated. Legs slender, yellow, including the coxæ; on the under side of the hind femora, before the apex, is a low swelling, in front of which is a robust, backwardly directed hook, while between the apex of the femur and the swelling on the inner side is a black, conical projection fringed near the base behind, with one large and two small tooth-like projections; on the front and also on the hind side of the hind tibiæ near the base is a fringe of short black bristles, below which, on the inner side of the tibia, is a conical projection, at which point the tibia is rather suddenly bent outward; hind metatarsi slightly thicker, but shorter, than the front ones. Halteres yellow. Wings grayish hyaline, stigma and veins brown, a long bristle on the costa near its base.

Female.—Same as the male, except that the front is slightly broader, the abdomen blackish, light gray pollinose, and the hind legs simple, but much thicker than the others. 4–5 mm.

Southern California (Coquillett).

Empis valentis Coquillett (Fig. 138).

Proc. Nat. Mus., 1895, p. 402.

Female.—Differs from *Empis comantis* as follows: femora entirely yellowish, apices of tibiæ and whole of tarsi black, third antennal joint twice as long as the first, style less than one-half as long as the third joint. Pile of thorax sparse, black; on each end of the pleura, coxæ, abdomen and venter, wholly black; on venter and on sides of abdomen very short and sparse. Scutellum destitute of white pile, naked, except for the ten marginal bristles. Abdomen opaque, light gray pollinose, hind margins of the fifth and sixth, and the following segments wholly, shining. Femora not thickened, the hind ones scarcely thicker than their tibiæ; pile and bristles of femora minute. Wings hyaline, anterior branch of the third vein straight and nearly perpendicular. 9 mm.

Northern California.

This species, which is associated with *E. comantis* only in locality, must be further characterized thus:

Male and Female.—Eyes of the male widely separated. The usual apical femoral black spot is broadened in the male; the hind femora of the male are curved and are provided with a large bifid tubercle on the under side at the outer fourth, the inner spur of which is short, the outer provided with a bunch of short black hairs, beyond this on the inner under edge of the femur is a small mammiform process, beyond which is a fringe consisting of four small black spine-like hairs; the hind tibiæ are nearly straight, near the base on the inner under side with a large tubercle, apically provided with a bunch of short black hairs forming a spur-like pencil, distal to this on the outer under edge of the tibia is a still larger tubercle, which is fringed outwardly by a series of long black hairs. Metatarsi not enlarged, tarsi strongly spinose beneath. Hypopygium terminal, small, closed, central filament swollen at the exposed base, upper lamellæ projecting beyond the middle ones. Halteres black. The scutellar bristles vary in number from six to twelve. The bristles in front of the halteres are dense, about twenty in number.

Numerous specimens from various parts of California.

Empis clauda Coquillett.

Proc. Wash. Acad., 1900, p. 407.

Black, the palpi, proboscis, humeri, lateral margins of metanotum, scutellum, a large spot below insertion of each wing, the halteres, coxæ and remainder of legs, also base of venter, yellow, apices of tarsi brown; eyes of male separated less than width of lowest ocellus, third joint of antennæ broad at base, tapering rapidly to the apex, about twice as long as the style, proboscis slightly over twice as long as height of head; hairs and bristles of body and legs black; mesonotum opaque, gray pruinose, marked with four indistinct, brownish vittæ; scutellum bearing four bristles; abdomen slightly polished, hypopygium small, ascending obliquely, the dorsal piece prolonged at each posterior corner in the form of a flattened, almost linear process, central filament unusually robust, arcuate, free, except toward its apex; no ventral process in front of the hypopygium; hind femora of male each bearing a hook-like process on the under side a short distance before the apex, curved backward and covered with short hairs, while beyond it are two bare, pimple-like swellings; on the inner side of the femora, nearer the apex, is a fringe of about five rather short spinous bristles; hind tibiæ of male each bearing a bare, slightly arcuate process on the outer side near the base, while opposite it, on the inner side, is a low prominence beset with short bristly hairs; legs of female simple, not fringed with scales; wings grayish hyaline, stigma brown, veins brown, normal. 5-7 mm.

Alaska.

Empis poplitea Loew.

Cent. iii, 29.

Male and Female.—Cinereous, opaque, all the hairs and bristles short, black. Head concolorous, black-pilose, eyes of the male separated. Antennæ black, third joint elongated and strongly attenuated towards the apex. Palpi very small, testaceous. Proboscis strong, black, badious above, nearly equalling twice the length of the head. Thorax with four fuscous vittæ. Hypopygium of the male small, rather sunked and closed, the upper lamellæ small, grayish black, the lower small, testaceous, the central filament hidden. Coxæ blackish, cinereous. Legs red, with sparse black pile, the hairs of the tibiæ and of the tarsi longer and a little more dense; the extreme tip of the femora spotted with a black dot; apex of the tibiæ blackish; tarsi black, the base of the first joint often dark red; posterior knees of the male drawn out into three strong apophyses, one at the tip of the femora and two at the base of the tibiæ. Halteres dusky yellow. Wings rather long, the veins strong, fuscous, stigma pale yellowish, rather faint. 5 mm.

Sitka, Alaska (Sahlberg).

Unfortunately the few minor characters omitted in this description make it impossible to include this species in our table.

Mr. Coquillett determines specimens received from Prof. Cockerell, from the Hudsonian Zone of New Mexico as Loew's species.

The following characters are common to the remaining species, which, with the five preceding, constitute a very natural group.

Body black, closely pollinose, occiput biseriately black bristly, densely above and beneath. Eyes dark red, separated as widely as the posterior ocelli at the narrowest part of the front in the male, and slightly more in the female. Palpi small, slender, curved, yellowish, more or less fuscous at the base, with one preapical minute black bristle, or none. Proboscis one and one-half to two times the head-height, dark red, not thick but strong, the labella slender, black. Antennæ black, equalling the eye-height, the first two joints cylindrical, with a few short black hairs, and more or less pruinose, together shorter than the third joint; third joint lanceolate, opaque jet black, the style one-third the length of the third joint, of smaller diameter than the tip of the joint. Thorax quadrivittate, generally with broad brown vittæ, the middle ones abbreviated posteriorly and the lateral ones anteriorly; the intervittal bristles minute, a small median row present; a bunch of bristles under the halteres, dorsum margined by three or four short macrochætæ. Abdomen straight, opaque pollinose, longer than the head and thorax together, with very few bristles and no pubescence; hypopygium small, closed, densely pubescent, the central filament swollen at the base, of the shape of a scorpion-sting, reddish. Coxæ dusted, provided with black bristles on the forward side, the hind ones always with a bunch near the tip below, trochanters tipped with black or wholly black, femora with a narrow terminal black ring if light colored;

legs more or less shining; tarsi always short spinose beneath; the hind knees of the male with peculiar sexual armament, legs of female simple, not fringed with scales; pulvilli and claws small, the pulvilli dirty white, the claws reddish at the base, black apically. Halteres pale yellow. Wings nearly pure hyaline, the veins strong, dark fuscous, no stigmal spot or with a very faint indication of one, no strong costal bristles.

Western species.

Empis aerobatica sp. nov.

Male and Female. Length 5 mm.—Gray-dusted species. Eyes of the male separated twice as widely as the posterior ocelli, of the female scarcely more. Palpi yellow, with one minute hair beneath. First antennal joint scarcely one and one-half times the length of the second joint. Thoracic vittæ narrow, as broad as the intervittæ, generally well defined, the intervittæ gray, with a slight bluish tinge when viewed in a strong light; but one marginal bristle above the base of the wings. Bristles of the occiput, pronotum, humeri, scutellum, abdomen and legs minute; scutellum with four bristles; about five minute bristles in front of the halteres, pectus with about three minute bristles on each side. Hypopygium in part gray-dusted; central filament gradually narrowed, brown; upper lamellæ triangular, about two-thirds as large as the middle ones, wholly visible. Coxæ more or less darkened at the base, legs fuscous, darker on the femora above and the tibiæ apically; tarsi short spinose, front and middle ones not enlarged, hind ones moderately thickened; hind femora not thicker than the tibiæ, not reaching the hypopygium, in the male provided with a short diagonally transverse process, the inner apical angle of which bears a pencil of black hairs, beyond which the inner inferior edge of the femur is ciliate with about four bristles and a few hairs; the base of the tibia bears on the under side two prominent tubercles, the first with a scattered pencil of black bristles, the second with a brush of short hairs on its obliquely truncate apical edge. Wings narrow, clear hyaline, those of the male with a very long base; furcation of the third vein variable, before the end of the marginal cell, or opposite the end, the posterior branch terminating near the extreme wing-tip; discal and posterior cells rather elongate, the hind margin of the discal cell about three-fourths the length of the outward continuation of that vein; anal vein much reduced, sharply vanishing.

Seven males and four females; California and Idaho.

This is the balloon-making fly about which Messrs. Aldrich and Turley have written a most entertaining account in the American Naturalist, 1899. The male forms a large hollow frothy bag, in the front end of which is imprisoned a small fly. Flying with this structure between its hind legs it courts the female who alights on the back of her selected mate. The pair then settle slowly to the ground, and after copulation the male discards the balloon which then has served its purpose of attracting the female during courtship.

Empis nodipes sp. nov. (Fig. 143).

Male. Length 6.5 mm.—A slender species. Cinereous, plumbeous. Eyes maroon-colored, separated as narrowly as the posterior ocelli, facets moderately small; palpi small, fuscous, with one short subapical black hair; proboscis scarcely one and one-half times the head-height, reddish, the black labella not reaching to the tip; antennæ slender, shorter than the head-height, black, piceous at the base, first joint over two times the length of the second, third joint three times the length of the first, lanceolate, the arista as long as the first joint; bristles of the occiput sparse, minute, in two transverse series. Thorax plumbeous gray, the dorsum with four narrow brown vittæ, the outer much abbreviated anteriorly; the intervittal bristles minute, the marginal macrochætæ short, few in number; four short bristles in the row in front of the halteres, pronotal bristles wanting (broken ?); but two small scutellar bristles. Abdomen slender, cinereous, opaque, without macrochætæ; hypopygium small, closed, central filament much swollen at base, the basal part exposed, remainder hidden, middle lamellæ convex, shining, truncated above, hiding the small upper lamellæ. Legs including the coxæ yellow, slender, tips of trochanters and of femora minutely black, tarsi brownish toward tip, tarsi slender, long, spinose beneath, metatarsi not thickened, macrochætæ of legs moderate; trochanters unarmed; hind femora swollen near the tip, the outer inferior angle of the swelling with a fringe of black bristle-like hairs; hind tibiæ with a similar swelling near its base, but ciliate on both sides with black hairs, hind tibiæ on inner side at the tip fimbriate with short yellow scales; hind femora not reaching the hypopygium, scarcely as thick on basal portion as the apical part of the tibiæ. Halteres pale yellow. Wings subhyaline, veins thin, dark fuscous, stigma obsolete; third vein furcate before the tip of the marginal cell, the posterior branch ending beyond the tip of the wing; the first section of the front border of the discal cell one-fourth the length of the second; second posterior cell very narrow at its base; no long costal bristles.

A single male; Magdalena, New Mexico.

Empis serperastrorum sp. nov. (Figs. 136, 145).

Length 6-7 mm.—Olivaceous gray species of exceedingly great variability in the color of the appendages. Palpi reddish to black, with a few hairs; proboscis wholly black, sometimes reddish on basal part, labella never exceeding the proboscis in length. First antennal joint two times the length of the second. Occipital bristles sparse, or dense; thoracic bristles sparse; scutellum with two small widely separated bristles, females often with four; the row in front of the halteres consisting of from three to five small bristles. Hypopygium small, terminal, not higher than the abdomen, or sometimes slightly larger, upper lamellæ concealed, central filament flat exteriorly, completely hidden, the tip not explanate. Legs including the coxæ wholly black, or wholly yellow, except the darkened tarsi, rather stoutish; the hind femora reaching the tip of the abdomen in the female, but comparatively shorter in the male; the hair-like bristles rather dense on the front metatarsi and on the outer portion of the hind tibiæ of the male; all the parts of the female leg slender; of the male the front metatarsi are swollen slightly beyond the thickness of their tibiæ, the remainder of the legs, except the hind knees, simple; hind femora widened laterally on the outer third before the tip, on the underside with a short, thick, transverse bifurcate process, the outer projection of which is closely fimbriate within with black scale-like hairs, while the inner is sharply angulate and terminates in a distal direction as a short spur, midway between the outer projection and the tip of the femur are three closely placed bristles; articulating into the distal end of the femur is a large bristling projection on the tibia, distal to which and articulating with the fimbriate edge of the outer bifurcation of the femoral process is a small median tubercle, across from this on the inner (posterior) side of the tibia is a prominent bifurcate bristly process directed distally and medially, beyond which is another median tubercle, but larger and more pointed than the first, or sometimes reduced to a mere swelling; the tips of the two bifurcate processes are always black, the bases are always concolorous with the rest of the legs; middle tibiæ of both sexes tipped with a series of from five to eight stiff black bristles on the inner side. Wings sometimes faintly smoky, veins narrow to strong; stigmal spot very faint; furcation of the third vein opposite or in advance of the tip of the marginal cell, its posterior branch ending beyond the wing-tip; the first section of the anterior boundary of the discal cell about one-fourth the length of the second section; hind margin of the discal cell shorter than the outward continuation of that vein.

Colorado and Idaho (J. M. Aldrich). Ninety specimens of both sexes.

Empis dolabraria sp. nov.

Male and Female. Length 6 mm.—A brownish species. First antennal joint one and one-half times the second; palpi yellow; occipital bristles numerous, confused, long below. Scutellum with six marginal bristles, the cluster in front of the halteres consisting of six to eight, a small bunch of hairs present above the base of the front coxæ; mesonotal vittæ broad, brownish, abdomen of the male brownish gray, concolorous with the scutellum, intervittal spaces and the pleuræ; abdomen of the female gray. Abdomen short; hypopygium small, outer portion of the base of the central filament visible, the middle lamellæ small, the upper lamellæ porrect, extending upwards. Coxæ blackish, the very tips paler, trochanters black; legs short, reddish, the tarsi black, hind femora and tibiæ somewhat bent, rather stout, the hind femora not reaching the end of the abdomen, tarsi long spinose beneath, hairs of the tibiæ strong, bristles short; male hind femora slightly swollen on the posterior side before the tip, beneath with a subapical transverse bifurcate process, the outer projection of which is long and tipped with a minute pencil, male hind tibiæ suddenly enlarged beyond the knee and there sparsely ciliate on both sides with black bristles, beyond the swelling there is a prominent process on the outer inferior edge fringed on the proximal side with short scale-like bristles. This articulates with the larger projection of the femoral process. Wings rather broad in the male, slender in the female, clear hyaline, the third vein furcate beyond the tip of the marginal cell, the posterior branch ending at the wing-tip, the proximal section of the anterior boundary of the discal cell more than one-fourth as long as the distal section, the hind boundary three-fifths as long as the continuation of that vein.

A male and a female; California (Baron).

Empis dolabraria subsp. nov. **disconvenita.**

An incipient species which will have to be connected with the foregoing for the present.

The differences lie in the wing-neuration ; the furcation of the third vein takes place opposite the end of the marginal cell, the posterior branch of the fork terminates beyond the extreme wing-tip ; the discal cell is larger, the first section of its front border is less than one-fifth the length of the second section, while the hind border is as long as the continuation of that vein. The occipital bristles are much stouter in this form.

One male and one female ; California.

Empis falcata sp. nov. (Fig. 137).

Male and Female. Length 7.5 mm. or less.—A very slender species, with sparse bristles. Face and front narrow; palpi pale, with two minute preapical hairs: labella less than two-thirds as long as the proboscis; antennæ slender, comparatively long, the first joint fully two times as long as the second, the third joint narrow at the base and gradually attenuated, rather blunt at the tip, the style less than one-fourth the length of the third joint. Scutellum with two small widely separated marginal bristles, and a minute outer pair on each side of these; no pectal bristles; pronotal collar minute but distinct; in front of the halteres are three small bristles. Hypopygium projecting above the abdomen, comparatively large, the central filament not suddenly enlarged, plainly visible at the base, the middle lamellæ large. Legs slender, wholly yellowish, except the usual spots on the trochanters and the knees, their bristles strong, especially on the hind tibiæ and the tarsi, but nowhere lengthened ; tarsi long and slender, especially the front and middle pairs; hind femora not reaching the hypopygium, with a subapical lateral tubercle on the posterior side, in front of which on the under side is a transverse bifurcate process, the inner (posterior) portion of which is slender, strongly curved and pointed, the outer is short and stout and tipped with a pencil of black scale-like bristles; hind tibiæ somewhat curved, slender at the knee, articulating with the lateral femoral process is an emarginate, almost medially placed process, the posterior portion of which is tipped with a small curved brush of black hairs, diagonally in front of this, but still on the lower side of the tibiæ, is a broad, flat protuberance, black apically and fringed on the outer edge with long stout black bristles. The third longitudinal vein furcate at the tip of the marginal cell, the posterior branch ending beyond the extreme wing tip, the first section of the anterior border of the discal cell less than one-third the length of the second section, the hind border shorter than the continuation of that vein.

One male from Berkely, California, March 26, 1897 ; collected by Dr. Wm. M. Wheeler. A male and a female, Juliaetta, Idaho; collected by Prof. J. M. Aldrich.

Empis canaster sp. nov. (Figs. 139, 140).

Male and Female. Length 7 mm.—A slender gray species. Palpi infuscated at the base, provided with one long and several short preapical fine black hairs; labella more deeply bifid than usual in this group; first antennal joint two times the second; the third joint rather slender; postocular bristles short. Prothoracic collar even; humeral bristles small; no pectal bristles; scutellar bristles inconstant, generally two small and two minute bristles; the row in front of the halteres with three to five small bristles. Abdomen slender, long; the middle lamellæ of the hypopygium erect, strongly shining, covering the upper lamellæ, the swollen basal part of the central filament visible. Coxæ reddish apically, or wholly yellow, their bristles reduced; legs slender, hind femora shorter than the abdomen; legs reddish, except the front tarsi and more or less of the remaining tarsi, which vary from brown to black; front metatarsi of the male three-fourths as long as their tibiæ and of slightly greater diameter; bristles of the legs becoming fine and long apically, especially on the outer side of the male hind tibiæ; the spine-like bristles of the plantar surface of the tarsi rather long; armament of the hind knees of the male close to the femero-tibial joint; hind femora slender, but little thickened at the armament, hind femora and tibiæ but little bent; near the tip of the hind femur the underside is produced into a short, bipartite, transverse process, the inner projection of which is short and sharply angular, the outer flattened, situated on the median line and capped by a close fringe of short black scales; between this structure and the tip of the femur is a short sharp, backwardly directed, median tooth; hind tibiæ gradually enlarged from the knee, the slender base with a single long process on the under side, tipped with a pencil of black bristle-like hairs; these structures are not bounded by fringes of bristles. Wings long, slender, very lightly infumated; the third vein furcate before the tip of the marginal cell, the posterior branch curved backward ending beyond the tip of the wing; posterior cells long; hind margin of the discal cell nearly one-half the length of the outward continuation of the vein, the first section of the anterior border nearly one-fourth the length of the second section.

Seven males, one female; Idaho, Oregon.

Empis mixopolia sp. nov.

Male and Female.—Rather stout small species of gray-brown color. Palpi infuscated more or less at the base, and with one distinct preapical bristle beneath; first antennal joint once and a half the length of the second joint, the third joint comparatively small; occipital bristles moderately long, in two well-defined rows. Thorax gray, more or less olivaceous on the dorsum and with the vittæ brown. scutellum gray, provided with four marginal bristles; the bristles of the pronotal collar long; a small bunch of hairs present on each side of the pectus; about ten uneven bristles in front of the halteres; between the four macrochætæ above the base of the wing and the humeral macrochætæ at most but three minute bristles on the margin of the mesonotum, the humeri with few minute bristles; abdomen with small bristles towards the base; middle lamellæ of the hypopygium yellowish at the extreme tip, not entirely concealing the upper lamellæ; the whole of the thickened base of the central filament exposed; hairs of the hypopygium short. Coxæ darkened at the base, their hairs minute; legs robust, short, reddish, the tarsi and the upper side of the femora blackened; the bristles of the outer side of the tibiæ strong, uniformly widely distant (*i. e.*, six on each side of the well-marked median glabrous streak); none of the metatarsi enlarged, the hind tarsi stoutest; hind femora distinctly bowed, hind tibiæ somewhat bent; hind femora of the male beneath with a single preapical flat tubercle which is tipped at its outer corner with a short pencil of black hairs, between this projection and the tip of the femur is a black fringe on each side beneath, the outer one containing only three minute hairs closely placed, the inner one conspicuous, consisting of four long, stout bristles, and as many hairs; the hind tibiæ of the male stout, with two prominent basal tubercles, one on each side of the median line and one in advance of the other, the more basal (on the inner side) capped by a pencil of black hairs, the other with a dense short brush. Wings clear hyaline, the third vein furcate just beyond the end of the marginal cell, its posterior branch ending at the extreme wing-tip or slightly in advance; the first section of the front border of the discal cell one-third to one-fourth the length of the outward continuation of that vein; the third vein turns slightly upward, leaving the first posterior cell distinctly wider than the first submarginal. 5 mm.

Numerous specimens from Idaho, collected by Prof. J. M. Aldrich.

Empis æripes sp. nov. (Fig. 141).

Female. Length 7.5 mm.—Stout species covered with whitish gray pollen. Antennæ stout, first joint two times the second; palpi strongly infuscated, except the apex, provided with numerous minute hairs below; occipital bristles strong and dense; pronotal, pectal, humeral and coxal bristles prominent; scutellum with eight to ten bristles, four to six short and four long, alternating, the central pair long; in front of the halteres is a cluster of about nine bristles. Thoracic vittæ narrow, faint, not at all brownish, but nearly concolorous with the rest of the body. Legs stout, dark fuscous, femora above, hind tibiæ apically and tarsi blackish; hind femora and tibiæ bent, the tibial bristles stout. Wings nearly clear, the very faint stigmal spot extremely narrow, veins blackish, clear-cut, the third vein sinuous, furcate beyond the tip of the marginal cell, the posterior branch terminating before the wing-tip, the first section of the front margin of the discal cell one-fourth the length of the second section, the posterior border two-thirds the length of the vein between the third and the fourth posterior cells.

Male.—Differing from the female very markedly in the color of the pollinose coating which is not pure gray but mixed with brown. The vittæ are brown and diffuse into the intervittal spaces. The armament of the legs is very similar to that of *mixopolia*, but is carried to a greater extent; the apical fringe of the lower inner side of the hind femora contains about ten strong bristles besides the four hairs; the more distal tubercle of the tibia is longer.

This, together with the preceding species, differs from all the other species of *Empis* in the structure of the armament of the male hind knees. It is distinct, however, from *mixopolia*, being a much larger and more robust form. The black color of the whole coxa, the numerous scutellar and other bristles, the larger discal cell and diffused vittæ of the thorax, the lateral ones of which are not so much abbreviated as in *mixopolia*, and the specialized structure of the hind legs readily separate this form from the preceding.

The collection contains numerous specimens of both sexes taken in Idaho, by Prof. J. M. Aldrich.

EMPIMORPHA Coquillett.

Same as *Empis*, except that the face is covered with long bristly hairs; antennal style apical, proboscis directed downward, longer than the height of the head; third vein forked; discal cell perfect, sending three veins to the wing margin; anal cell shorter than the second basal, the vein at its apex nearly parallel with the hind margin of the wing.

Pile in front of the halteres and on the sides of the abdomen black..........2.
Pile in front of the halteres and on the sides of the abdomen whitish. **comantis** Coquillett.
2. Palpi, proboscis, legs and halteres largely reddish..........**barbata** Loew.
Palpi, proboscis, legs and halteres black ....**geneatis** sp. nov.

Empimorpha barbata Loew (Fig. 106).

Empis barbata Loew, Cent. ii, 19.

Head black, with long black pile. Eyes large, subcontiguous (male). First two joints of the black antennæ clothed with long black pile. Face bearded with black pile. Palpi large, badious, with black pile. Proboscis very long, much thickened at base. Thoracic dorsum black, opaque, black-pilose, with three cinereous vittæ, the median narrow, the outer ones broad. Pleuræ black, with cinereous-yellow pollen, bare, except for the bunch of black hairs in front of the halteres. Abdomen black, subshining, opaque, towards the sides with cinereous pollen, and provided with long black hairs. Hypopygium small, black-pilose, the lower lamellæ large, ovate, the middle filament short, awl-shaped. Legs badious, with black hair, the extreme tip of the tibiæ and the tarsi black, but the metatarsi, except the apex, and the base of the next few joints badious. Wings long, rather narrow towards the apex, fuscous, the costal cell ferruginous. 9 mm.

California.

Empimorpha geneatis sp. nov. (Fig. 105).

Male. Length 6.5 mm.—Black, occiput, pleuræ and coxæ lightly and finely gray-pollinose. Eyes contiguous above the antennæ; face, sides of occiput, cheeks, palpi and upper side of the first antennal joint bearing very many long black hairs. Antennæ one-fourth longer than the height of the head, slender, black, first joint equalling one-third the length of the antenna, second joint and style short. Dorsum of thorax black, opaque, with two faint gray vittæ; very sparingly hairy, a longer bunch of black hairs above the root of the wings; margin of scutellum with about fourteen hairs; a bunch of black hairs present between base of the wings and the halteres. Sides of first three abdominal segments with black hairs, remainder of tergum nude (the venter is eaten off by parasites); hypopygium small, not constricted at base, black, from the under side projects a small curved process, upper valves short-hairy. Legs piceous, with black hairs, especially on front side of the coxæ, and upper and under sides of the front and middle femora and tibiæ; hind legs gradually thickened, hind tarsal joints swollen, remainder of legs slender, simple. Halteres piceous. Wings cinereous-hyaline, stigma faintly fuscous, veins dark brown.

One male; California (Baron).

Empimorpha comantis Coquillett.

Proc. Nat. Mus., 1895, p. 396.

Head black, gray pollinose; pile of face mixed with black and white; eyes narrowly separated, the space between them being narrower than the width of the lowest ocellus, the upper facets being noticeably larger than the lower ones; antennæ black, the second joint reddish, slightly over one-third as long as the first; third joint subequal to the first, twice as long as broad; style slender, as long as the third joint; proboscis two and one-half times as long as the height of the head, projecting obliquely downward; palpi slender, curving upward, yellowish, the base brown, the pile black and white. Thorax black, shining, three vittæ and the broad lateral margins opaque gray pollinose; pile of thorax very abundant whitish, two longitudinal stripes of largely black pile on the dorsum; pleura black, thickly whitish pilose, destitute of stout bristles. Abdomen shining black, depressed, twice as long as wide; its pile very abundant, on the first two segments and the sides of the others largely whitish, on dorsum of the remaining segments mostly black; legs rather robust, reddish yellow; coxæ, under side of each femur, apex of each tibia and of each tarsal joint blackish; legs simple, the pile abundant. Halteres black. Wings hyaline, grayish towards the apex; veins, stigma and a spot above furcation of second and third veins dark brown. The female is the same as the above, except that the first abdominal segment and the bases of the next two are opaque gray pollinose. 11 mm.

Northern California (C. Fuchs).

PACHYMERIA Macquart.

Sparsely hairy species of stout aspect and gray-black color, very much resembling *Empis*. This genus grades into *Empis* and *Rhamphomyia*, but differs in that both sexes are dichoptic, that all the femora are about equal in length, and that the hind femora are strongly thickened.

Abdomen black, with white pollinose spots towards the apex... **pudica** Loew.
Abdomen unicolorous black.................................... **brevis** Loew.

Pachymeria pudica Loew.

Cent. i, 35.

Head dark cinereous. Antennæ black, first two joints cinerascent, sometimes partly fuscous. Proboscis very long. Thorax 4-vittate with fuscous, with short and sparse black hairs. Abdomen short, broad, black, shining, subglabrous, with fine pale hairs, longer at the base and at the basal part of the lateral margins;

last abdominal segment almost completely white-pollinose; the preceding segments marked on each side with a white-pollinose spot, very large in the female, but smaller and not reaching the posterior margins of the segments in the male. Hypopygium small; the upper appendages changed from lamellæ to small, swollen, ovate, dusky yellow, very short and very finely pubescent bodies; filament concealed. Coxæ dusky gray, yellowish towards apex; femora black, apically badious, sometimes wholly badious, below marked with a large black spot; tibiæ testaceous, base often broadly badious; tarsi testaceous, last joint black. Halteres whitish. Wings very pale cinerascent, veins fuscous. 5 mm.

District of Columbia (Osten Sacken).

Pachymeria brevis Loew.

Cent. ii, 22.

Head black, cinereous with pale pollen, occiput black-pilose. Antennæ black. Dorsum of thorax cinereous with pale pollen, very faintly sub-vittate, provided with rigid hairs and black macrochætæ. Scutellum concolorous with the thorax, with four marginal black bristles. Pleuræ black, cinereo-pollinose, and black-pilose. Abdomen rather broad, sub-depressed, black, and black-pilose. Hypopygium small, compressed, black, the lower lamellæ ovate. the central filament pale yellow, low, arcuate. Coxæ black, cinereo-pollinose, black-pilose. Wings cinerascent, veins fuscous. 4.2 mm.

District of Columbia (Osten Sacken).

ITEAPHILA Zetterstedt.

Small, blackish, rather thickly pubescent, *Empis*-like species. Antennæ longer than the head, plainly three-jointed, basal joints short, with erect hairs, last joint oval, bare, with a very short arista. Proboscis as long (female) or longer than the head, rather thick, horizontal, palpi lengthened. Eyes of male contiguous, of the female widely separated. The male abdomen small, with projecting anal appendages. Legs slender, simple. Wings with the third vein forked, the upper branch reaching straight to the costa; discal cell present, with three apical veins; anal cell shorter than the second basal, both bounded by a cross-vein almost parallel with the hind margin; anal angle strong.

Iteaphila Macquarti Zeterstedt.

Ins. Lapponica, 541, i.

Black, or piceous. Thoracic dorsum indistinctly vittate. Halteres black. Legs black with reddish knees. Wings brownish (male) or hyaline (female) with the veins plainly bordered with brown. 4 mm.

New Hampshire, Quebec.

Iteaphila perigrina sp. nov. (Fig. 97).

Length 3 mm.—Black, abdomen more or less piceous, feebly dusted and therefore sub-shining, provided with sparse, slender hairs; eyes of the male broadly contiguous, their facets large, the lowest ones smaller, eyes of the female separated more widely than the ocelli, their facets as large as the smallest of the male; face of nearly uniform breadth. Proboscis very slender, extending straight forward, nearly one and one-half times the height of the head; palpi prominent, slender, extending beyond the epistome. Antennæ black, short, the basal joints short and thick, the third joint lanceolate, robust, the stout arista one-third the length of the third joint. Occiput with slender hairs. Thoracic dorsum evittate, but with the dorsicentral bristles prominent; scutellum with four slender bristles. Abdomen slender, long; hypopygium small, terminal, widely open. Legs very slender, simple, fuscous, the posterior tibiæ gradually and slightly thickened towards the apex; all the tibiæ provided with small terminal spurs; tarsi slender not spinose below. Halteres infuscated. Wings lightly infumated in the male, and clear hyaline in the female, veins narrow, fuscous, stigma indefinite; the furcation of the third vein acute, taking place beyond the tip of the marginal cell, sixth vein evanescent.

Seven specimens; San Diego Co., California (Wm. M. Wheeler).

This species, while differing from the typical *Iteaphila* by its very slender proboscis, is not a true *Empis*, and had best be included here.

MICROPHORUS Macquart.

Small, black, moderately hairy species. Of the European forms the antennæ are as long as the head, apparently two-jointed, with a short two-jointed arista; proboscis short, not projecting forward; palpi cylindrical; eyes bare, of both sexes separated, but approximate. Thorax hunchbacked. Abdomen of male blunt at the end, of the female pointed. Legs slender, bristly, the hind ones lengthened, tibiæ sometimes thickened apically. Third vein unforked; discal cell with three apical veins; anal cell shorter than the second basal cell, both bounded by one cross-vein, extending almost parallel with the hind margin; anal vein obsolete; anal angle almost rectangular.

Since Walker was familiar with at least one European species of *Microphorus*, *drapetoides* is left in the genus as given in its European sense. However, his selection for the specific name is not descriptive of the other species, and therefore his species probably does not conform with the characterization above given. The diagnosis is too meagre to allow any certainty to be placed on Mr. Walker's determination, and thus the location of *drapetoides* in the present genus is mere conjecture.

Microphorus drapetoides Walker.

List Dipt. Ins., iii, 489.

Body black, hairy; eyes piceous; feelers and lip black, the latter short; legs piceous, clothed with short black hairs; wings dark brown, slightly tawny along part of the fore border from the base; wing-ribs and veins piceous. 2.5 mm.

St. Martin's Falls, Albany River, Hudson's Bay.

HOLOCLERA Schiner.

Small, nearly bare species of black coloration. The antennæ elongate, with the first joint minute, the third lengthened, lanceolate or attenuate, with an elongate style. Proboscis slender, horizontal. Eyes of the male contiguous. Thorax greatly hunchbacked. Male genitalia prominent, in our species pedunculate and flexed to the right. Legs more or less ciliated with fine hairs; the hind tibiæ and metatarsi thickened. Wings short and broad, with a simple third vein; discal cell emitting three veins; anal cell rounded, the anal vein not continued; anal angle rectangular, very prominent.

A genus previously unrecognized on this continent.

Body opaque gray pruinose.................................**ravida** Coquillett.
Body not conspicuously gray pollinose...2.
2. Thorax bilineate; halteres whitish.........................**bilineata** sp. nov.
Thorax evenly dusted; halteres black.......................................3.
3. Under side of front femora devoid of cilia; wings infumated; stigma indistinct. **sycophantor** sp. nov.
Under side of all the femora ciliate; wings clear hyaline; stigma distinct. **atrata** Coquillett.

Holocera ravida Coquillett.

Microphorus ravidus Coquillett, Proc. Nat. Mus., 1895, p. 409.

Black, only the halteres whitish. Eyes contiguous, third antennal joint elongate, conical, the apical style slightly longer than the third joint; probosis nearly perpendicular, from two-thirds as long to as long as the height of the head. Thorax, pleuræ, scutellum, and abdomen opaque gray pollinose, the bristles black, scutellum bearing four bristles; hypopygium rather large, bent around against the right side of the abdomen. Wings grayish hyaline, slightly smoky along the veins, stigma and veins brown, no vein issues from the anal cell; this cell is nearly as long as the second basal, the vein at its apex arcuate and not parallel with the hind margin of the wing. 2 mm.

The female differs from this in having the eyes broadly separated and the abdomen very blunt at the apex.

Southern California.

Holoclera atrata Coquillett.

Microphorus atratus, Proc. Wash. Acad. Sci., 1901, p. 412.

Black, including the hairs; eyes of male contiguous, the third joint of antennæ orbicular on its basal half, the remainder narrowed into a styliform process, style one and one-half times as long as the third antennal joint, proboscis less than half as long as height of the head, body opaque, not pruinose, the hairs rather long, on the mesonotum abundant, on the abdomen sparse, scutellum bearing four bristles; under side of front and middle femora, both sides of the hind ones and outer side of hind tibiæ ciliate nearly their entire length with rather long hairs, first joint of hind tarsi noticeably thicker than that of either of the other tarsi, much narrower than the hind tibiæ; wings hyaline, veins and stigma brown, venation normal, last section of fifth vein two-thirds as long as the preceding section, sixth vein obsolete beyond end of anal cell. 2 mm.

Alaska.

Holoclera bilineata sp. nov. (Fig. 99).

Length 1.75 mm.—Black, covered with dark olivaceous gray dust. Eyes large, broadly contiguous, facets small. Antennæ one-half the eye-height, first joint invisible, third joint lanceolate, the style two-thirds as long as the third joint. Proboscis very short, horizontal, hairy beneath; palpi short, black. Thorax remarkably hunchbacked, the dust obliterated on the dorsum along two narrow vittæ, but bounding these becoming black; mesonotal bristles black, dense, short in front; scutellum with about six marginal bristles. Hairs of abdomen fine, yellow; hypopygium smaller than in the preceding species, pedunculate and flexed to the right, its parts not visible. Legs, including tip of coxæ yellowish-brown, middle femora with a few apical cilia below, hind femora ciliate above and hind tibiæ outwardly; hind tibiæ enlarged and compressed, hind metatarsi distinctly enlarged, but not nearly as much so as the tibiæ, as long as the three following joints only. Halteres yellowish. Wings clear hyaline, veins narrow, an elliptical brown stigma present; the vein between the discal cell and the third posterior three times that between the discal and the second posterior cells; the hind margin of the discal cell sub-equal to its prolongation.

Nine males; Opelousas, La. (G. R. Pilate).

Holoclera sycophantor sp. nov.

Length 2 mm.—Wholly black, opaque, dusted with dark olivaceous. Eyes large, broadly contiguous on the front, facets small. Antennæ short, apparently two-jointed as the first joint is minute; third joint broad at the base then suddenly attenuate and lengthened, its style slender, one-half the length of the third joint. Proboscis shorter than the length of the head, horizontal; palpi conspicuous, black-bristly, porrect also. Occiput regularly ciliate with close bristles. Thorax sparsely black-bristly, the bristles long; scutellum with four bristles. Abdomen cylindrical, covered with long black bristles; hypopygium large, flexed toward the right, the central filament exposed at the tip, horizontal, piceous. Legs moderately short, especially the anterior pairs, stoutish, black, the upper side of all the femora, the lower side of the hind ones (and sparsely so on the middle ones), the outer side of all the tibiæ, especially the hind ones, ciliate with black hairs; hind tibiæ enlarged apically, but compressed; hind metatarsi a little larger than the other joints but of less length than the rest of the tarsus taken together. Halteres infuscated. Wings smoky, veins dark, stigma indistinct; the outward boundaries of the discal cell sub-equal.

Eight males; Idaho (Prof. J. M. Aldrich).

It may be noticed that only males of this genus have so far been taken in North America.

CYRTOMA Meigen.

Small, finely hairy species. Antennæ shorter than the head, apparently two-jointed, outer joint lanceolate or ovate, with a short end bristle. Proboscis short. Eyes bare, contiguous above. Thorax prominent, abdomen lengthened. Legs slender, posterior pair lengthened, with the tibiæ thickened apically; hind metatarsi long and more or less thickened. Wings with a simple third vein, no discal cell, three veins arise in the middle of the wing ending in the margin; anal cell shorter than the second basal, both bounded by a vein almost parallel with the hind margin; anal angle rectangular, prominent.

Hind femora incrassate, hybotine-like species, hind tibiæ yellowish at base....2.
Hind femora not incrassate, empidine-like species, legs black................3.
2. Species measuring three millimeters, hind tibiæ three-fourths the length of their femora.................................**femorata** Loew.
More than four millimeters long, hind tibiæ five-sixths the length of their femora...**procera** Loew.
3. Halteres whitish, pile of abdomen dull whitish.........**halteralis** Loew.
Halteres blackish, pile of abdomen black in part........................4.
4. Legs moderately pilose, slender and piceous..............**longipes** Loew.
Legs strongly pilose, robust and jet black.................**pilipes** Loew.

Cyrtoma femorata Loew.

Cent. v, 69.

Black, antennæ concolorous, third joint lanceolate. Thorax cinereo-pollinose. Pile of thorax and scutellum sparse, black. Abdomen shining, with scattered white pile; segments on the front half obsoletely cinereo-pollinose. Legs long, black, black pilose, tips of the coxæ and the knees testaceous; hind femora thickened; front tibiæ rather stout; hind tibiæ thick, truncate, luteous, towards the tip black. Halteres whitish. Wings fusco-cinereous, veins fuscous, stigma obsoletely subfuscous. 3 mm.

New Hampshire (Osten Sacken).

Cyrtoma procera Loew.

Cent. v, 70.

Black, antennæ concolorous, third joint broad and ovate basally, slender apically. Thorax lightly cinereo-pollinose, its pile black. Abdomen shining, with scattered white pile. Legs long, black, black-pilose, apex of the coxæ and the knees luteous; hind femora incrassate; front tibiæ hardly thickened basally; hind tibiæ thick, obliquely truncate, luteous, towards tip black. Halteres whitish. Wings fusco-cinereous, veins fuscous, stigma obsoletely subfuscous. 4.5 mm.

Sitka, Alaska (Kolenati).

Cyrtoma halteralis Loew.

Cent. ii, 46.

Wholly black, somewhat shining. Pile of thorax and scutellum either wholly or in part black, that of abdomen dirty white. Apically the hind tibiæ slightly incrassate. Halteres whitish. Wings pale fuscous, stigma saturate fuscous. 2.2 mm.

District of Columbia (Osten Sacken), Wisconsin (Wheeler).

Cyrtoma longipes Loew (Fig. 71).

Cent. ii, 47.

Wholly black, shining. Pile of the thorax and of the scutellum black. Pile of abdomen above black, along sides and beneath pale; abdomen of male above opaque. Legs longer and more slender than usual, moderately pilose, hind tibiæ somewhat thickened apically. Halteres dark brown. Wings blackish. 2.6 mm.

Massachusetts, New Hampshire, Wisconsin, Illinois, Wyoming, New Mexico.

Cyrtoma pilipes Loew.

Cent. ii, 48.

Black, shining. The pile of the thorax and scutellum, and partly that of the abdomen black. Legs rather strong and closely black-pilose, hind tibiæ a little thickened, especially apically. Halteres black; wings blackish. 3 mm.

Illinois (Le Baron), Alaska (Kincaid).

MYTHICOMYINÆ.

HILAROMORPHA Schiner.

Although *Hilaromorpha* has been assigned to the Leptidæ by most writers, it is included in the present paper mainly because in the tables of the only complete Manual of the North American Diptera, that of Dr. Williston, specimens of the genus would run to the Empididæ, and not because it is any firm belief of the writer that *Hilaromorpha* can be an Empid, and only an Empid.

Small, bare species of blackish gray color. Antennæ three-jointed, the first two joints short, the third lengthened, broad, toward the end suddenly narrowed, with a short two-jointed bristle. Proboscis short, projecting slightly; labellæ broad; palpi two-jointed, strongly thickened at the end, lamellate, as long as the proboscis. Eyes of the male contiguous on the front, of the female separated by the front. Three ocelli. Thorax strongly arched; abdomen arched posteriorly, transversely wrinkled, in both sexes pointed, in the males the projecting genitalia are attached to the small end of the abdomen; these consist of broad claw-like side pieces, which are brought together to form a thick, globose body. Legs slender, the hind ones somewhat lengthened. The third and fourth veins of the wing forked; discal cell wanting; anal cell broad up to the wing-margin, closed. Anal angle well-developed.

Legs black, except the yellowish knees .... **obscura** Bigot.
Legs yellow, except the darkened tarsi .... **Mikii** Williston.

Hilaromorpha obscura Bigot.

Bull. Soc. Ent. France (6), vii (1887), p. cxl.
Ann. Ent. Soc. France, 1889, p. 129.

Entirely of an opaque black, except the yellowish knees; venter pruinose, and of a dark gray color; wings infumated, darker along the outer border, with an elongated, diffused, blackish stigma. 5 mm.

California.

Hilaromorpha Mikii Williston.

Psyche, 1888, p. 100.

Male.—Face opaque gray, with grooves from the oral margin. Antennæ brownish yellow; the third joint oval, a little longer than broad, the anterior borders straight or gently concave to the insertion of the slender two-jointed style, which is nearly as long as the body of the joint. Thorax in ground color black, thickly covered with opaque yellowish pollen on the mesonotum; on the pleuræ with lighter, less dense pollen. Abdomen with each segment anteriorly brownish black; posteriorly banded with opaque yellow, of a color somewhat lighter than that of the mesonotum. Legs yellow, the terminal joints of the tarsi infuscated. Wings blackish, a little lighter behind. 4 mm.

Carlinville, Illinois (Robertson).

MYTHICOMYIA Coquillett.

Body with no macrochætæ. Head globular, attached to a distinct neck. Antennæ porrect, two-thirds the height of the head, the first joint very short, the second as broad as long; the third broad, lanceolate, not annulate. nearly three times the second; style terminal, nearly one half as long and one third as broad as the third joint, very densely pubescent. Eyes of the male contiguous, and with an area of enlarged facets above. Three widely separated, equidistant ocelli present. Proboscis rigid, nearly as long as the head height, directed obliquely forward, no labellæ; palpi minute. Thorax greatly arched, in profile higher than long. Wings with the marginal cell closed, only one submarginal cell and four posterior cells, all open, as is also the anal cell; first section of the fourth vein colorless, the last (seventh vein) very weak. Legs rather stout, but none of the parts dilated, with no bristles, spines or other processes; front coxæ less than one half the length of the femora; pulvilli well developed, empodium bristle-like.

Tibiæ, halteres, first vein and second section of the costa yellow.
Rileyi Coquillett.
Tibiæ, except at base, black; upper side of knob of halteres also black; first vein and costa brown .... **tibialis** Coquillett.

Mythicomyia Rileyi Coquillett.

Ent. News, 1893, p. 209.

Black, the frontal triangle, face, humeri, base of the first and apices of the other abdominal segments, excepting the last, apex of femora, tibiæ wholly, and the halteres white, the short sparse hairs also white; occiput, thorax and abdomen gray pollinose, the hypopygium shining, one and one-third times as high as long, shorter than but projecting one-fourth its height above the eighth abdominal segment. Wings wholly hyaline. 2.5 mm.

California; Mesilla Park, New Mexico (T. D. A. Cockerell).

Mythicomyia tibialis Coquillett.

Proc. Nat. Mus., 1895, p. 409.

Male.—Black, frontal triangle, face, cheeks, humeri and each hind corner of the thorax whitish; halteres, except upper side of the knob, hypopygium largely, knees and base of hind metatarsi yellowish. Head, sides of thorax, pleura and scutellum gray pollinose, abdomen deep velvet black; pile of head and body whitish. Wings wholly hyaline, veins black, the auxiliary and bases of the other veins yellowish. On the under side of the hind metatarsi, before its middle, is a rounded notch, in front of which is a round process. 3.5 mm.

Los Angeles Co., Calif. (Coquillett).

ADDITIONAL NOTES AND DESCRIPTIONS.

During the time the foregoing pages have been going through the press a number of additions have been made resulting from the courtesies of several gentlemen. Through the kindness of Mr. Samuel Henshaw the types of this family described by Dr. H. Loew have been examined at Cambridge, which has introduced a number of synonymical changes and brought to light several previously undescribed species. Charles W. Johnson, J. Chester Bradley and George M. Greene have each contributed to our knowledge of this family since the first collection was amassed. But the most important of the following additions are the result of an expedition to New Mexico during May and June of this year, undertaken by James A. G. Rehn and Henry L. Viereck, under the direction of the Philadelphia Academy of Natural Sciences. During one month's time, Mr. Viereck collected twenty-three species of Empididæ of which only eleven were previously described. The twelve other forms are included among the new species given in the main paper or are described below. I wish to thank Miss Mabel Evans also for her assistance in reading the proof of this article.

Page 205.

STILPON.

Sides of front and vertex nearly parallel; hind metatarsi thickened and darkened .... 2.
Vertex broadened; hind metatarsi not thickened .... 3.
2. Veins bordered with brown; abdomen brick-red .... **varipes** Loew.
Veins not bordered; abdomen blackish .... **pectinger** mihi.
3. Thorax closely pollinose; first vein ending at middle of wing. **Houghii** mihi.
Thorax shining; first vein ending before middle of wing .... 4.
4. Legs yellowish; basal cells equal, small .... **minuta** sp. nov.
Legs black; second basal cell larger .... **nigripes** sp. nov.

Stilpon nigripes sp. nov.

Male and Female. Length 1 mm.—Black species. Eyes nearly contiguous on the face and just above the antennæ; vertex broadened. Proboscis short, incurved, black, palpi blackish, with dusky hairs. Antennæ black, the outer joint short ovate, rather pointed, not larger than the inner joint, the long seta subterminal. Thorax shining black, the sparse pubescence dusky, appressed, scutellum with two long and two short bristles. Abdomen subopaque, black, hypopygium large, gaping, the upper valve ascending, hood-shaped, shining, the lower portion pedunculate, projecting, provided with many short bristly hairs on the outer portion, a curved central exserted penis present. Legs black, short, robust, all the femora moderately thickened, no swellings nor ciliation. Halteres black. Wings clear hyaline, veins black, first vein much stronger than the others, ending at middle of costa, second vein ending midway between first and third, third and fourth veins parallel, fifth vein ending opposite the second vein, second basal cell broad and one-half longer than the first, its cross-vein nearly perpendicular.

One male and nine females. Alamogordo (Middle Sonoran); Highrolls (Upper Sonoran), and Cloudcroft (Canadian Zone), New Mexico. May and June, 1902. (H. L. Viereck.)

Stilpon minuta sp. nov.

Female. Length 1 mm.—Black, shining species, with yellow legs. Eyes contiguous just below and above the antennæ, front narrow, sides diverging, vertex broad, triangular. Antennæ dusky, the outer joint short, oval, the long seta subdorsal. Proboscis short, incurved, black, palpi small yellowish. Thorax and abdomen shining, their sparse hairs dusky, scutellum with two long and two shorter bristles. Legs including the coxæ dusky yellow, simple, not fringed, femora but little thickened. Halteres dusky. Wings hyaline, unspotted, veins dark fuscous, uniform, the second vein ends at the middle of the costa, second section of the costa about one-half the length of the third, third and fourth veins gradually diverging, basal cells short, equal, posterior cross-vein oblique, fifth vein ends beyond the second vein.

Three females; Cloudcroft and Highrolls, New Mexico. June, 1902. (H. L. Viereck.)

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Drapetis nitida mihi.

Is the same as *unipila* Loew.

Page 210. **Drapetis pubescens** Loew.

The basal cells are large for this genus.

Page 212. **Drapetis spectabilis** mihi.

In the collection of the Museum of Comparative Zoology at Cambridge are three specimens from Bosque Co., Texas (Belfrage).

Drapetis xanthopodus Williston.

Is the same as *gilvipes* Loew.

Page 214. **Platypalpus lupatus** sp. nov.

Male. Length 2.5 mm.—Black species, head and thorax overlaid with hair-like tomentum. Face white. Antennæ black, the outer joint oval, its style two and a half times its length. Proboscis black. Bristles of body and of legs dirty white. scutellum with two long and two short bristles. The glabrous space of the mesopleuræ small. Abdomen and hypopygium shining black, the latter twisted to the right, the basal edge of the under side with several long black hairs. Coxæ black, piceous apically; legs black, except towards the trochanters and knees, the hind tibiæ and the bases of the tarsal joints, which places are dull yellowish; front femora thickened as much as the middle ones, front tibiæ stouter than the middle ones, middle tibiæ with a strong apical spur, remainder of legs simple; legs with scattered yellowish hairs, longer beneath on the femora, front tibiæ with about ten longer hairs on the front edge, the hairs gradually becoming long below and not arranged in a definite series. Halteres yellow. Wings hyaline, veins fuscous, third vein straight, fourth vein slightly sinuous. subparallel with the third and slightly diverging from it at the tip, second basal cell the longer, its cross-vein oblique, the distance between the two cross-veins on the fourth vein less than the length of the anterior cross-vein, anal cross-vein straight, inflexed, evanescent, anal vein faint, obsolete at base.

One male; Cloudcroft, New Mexico. May 27, 1902. (H. L. Viereck.)

This species is associated with the eastern *pachycnemus*, but in that form the antennæ are dark fuscous, the front femora but slightly thickened, the third vein incurved, converging with the fourth, while along the fore edge of the front tibiæ there is a series of but seven hairs, with a similar series also on the hinder edge. The hairs of the inner edge are finer and number eight. *Pachycnemus* measures 2.3 mm.

Platypalpus Vierecki sp. nov.

Male and Female. Length 2.5 mm.—Black pollinose species, with yellow legs. Face and front whitish, occiput cinereous, beneath with dense white hairs. Antennæ yellowish, extreme tip of the outer joint and the arista dusky. outer joint lanceolate. the arista but little longer than the antenna. Proboscis black, palpi prominent, yellow. Thorax with golden dust above, becoming cinereous on pleuræ, a small shining space present above the middle coxæ; bristles yellow, scutellum with two moderately long and two short bristles. Abdomen dusted with gray, hypopygium small, black, terminal, not pollinose, upper piece with a close fringe of yellow bristles on the left side. Legs including coxæ pale yellow, tarsi strongly annulate with black, spur of middle tibiæ prominent, black, front femora nearly as thick as middle ones, fringed beneath with white cilia, middle femora and tibiæ with a double series of minute setulæ on under surface, front tibiæ slightly bowed and incrassate. Halteres whitish. Wings yellowish, veins yellow, anal vein obsolete at base, distance between the two cross-veins on the fourth vein somewhat greater than the length of the first cross-vein, second basal cell the longer, its cross-vein oblique, third and fourth veins parallel.

Var.—Ground color of abdomen becoming yellow.

Numerous specimens, the males predominating. Cloudcroft, New Mexico, May 27, 1902. H. L. Viereck, collector.

This species will run to *crassifemoris* in the table on page 215, *anteâ*, but is sufficiently differentiated by its pollinose abdomen. Only two other of the previously described species of *Platypalpus* (*canus* and *incurvus*) have the abdomen pollinose, but as both of these have black antennæ the present form can be quickly recognized. The following species should also be compared.

Platypalpus rufiventris sp. nov.

Male and Female. Length 2-2.5 mm.—Thorax black, gray dusted, abdomen testaceous, lightly dusted, subshining. Face and front whitish, occiput cinereous. Antennæ black, short, outer joint short, ovate, pointed, its bristle twice its length. Thoracic notum and abdomen with yellowish tomentum, pleuræ cinereous, the usual shining spot overlaid with pollen also, bristles yellow, scutellum with two moderate bristles. Abdomen lightly dusted, less so in the female. in the male dusky at the base, in the female reddish yellow. hypopygium small, blackish, with a few long yellow hairs extending laterally from the left side. Legs including the coxæ yellow, tarsi not annulate, their very tip dusky, spur of middle tibiæ black, front tibiæ not incrassate, front femora half as thick as the middle ones. Halteres yellow; wings as in *Vierecki.*

One male, seven females; Cloudcroft, New Mexico. June 17, 1902. (H. L. Viereck).

This and the variety of the preceding species are the only North American species of *Platypalpus* known with black thorax and red abdomen. It can be quickly distinguished from *Vierecki* by the shape and color of the antennæ, and by the uniform tarsal coloration.

Page 219. **Platypalpus lætus** Loew.

The tibial spur is as large as usual for this genus. The apices of the tarsal joints are scarcely darker than the rest. The third and fourth veins gently converge before the tip of the wing and then continue subparallel.

Platypalpus flavirostris Loew.

Loew's type specimen has four narrow dusky vittæ on the castaneous thoracic notum. Another female from the Osten Sacken collection is somewhat smaller and has no dark vittæ. The ground color of the head is black.

Page 222. **Platypalyus discifer** Loew.

The middle tarsi of the male are greatly enlargened and flattened, and feathered along the edge with close black scale-like hairs.

The species *trivialis*, *æqualis* and *crassifemoris* of *Platypalpus* are all quite similar, and probably represent one extremely variable species. The characters chosen in the table will render the divisions somewhat homogeneous, but too much stress must not be laid on the infallibity of the separation. The species as defined in this way do not conform exactly with those Dr. Loew had in mind.

Page 225. TACHYDROMIA.

Modify table as follows:

10. Wings with a black spot at outer third of costal margin. **maculipennis** Walker.
  Wings infumated, except the whitish base .... 10*a*.
10*a*. Anal cross-vein wanting .... 11.
  Anal cross-vein present .... 11*a*.
11. Legs black; second basal cell shorter than first ...... **nubifera** Coquillett.
  Legs more or less yellowish; second basal longer than first .. **pusilla** Loew.
11*a*. Front tibiæ strongly incrassate; first basal cross-vein oblique, second perpendicular .... **clavipes** Loew.
  Front tibiæ not greatly thickened .... 12.
12. Second basal cell but little exceeding the first, its cross-vein perpendicular; proboscis reddish at base .... 13.
  Second basal cell longer than the first by at least the length of its oblique cross-vein; proboscis black; pleuræ shining .... **rapax** Loew.
13. Pleuræ shining; front tibiæ with no teeth below; middle femora more slender than front ones; eastern species .... 13*a*.
  Pleuræ opaque; front tibiæ closely mucronate with black setulæ below; middle femora as thick as the front ones; western species. **corticalis** sp. nov.
13*a*. Front femora bare beneath; hypopygium without bristles. **rostrata** Loew.
  Front femora ciliate beneath; hypopygium with long black bristles above. **brachialis** sp. nov.

Tachydromia nubifera Coquillett.

Fur Seals and Fur Seal Islands of N. Pacif. Ocean, 1898, iv, p. 343.

Male and Female.—Black, the bases of the halteres yellow; hairs and bristles black; head and thorax subopaque gray pruinose. Third joint of the antennæ oval, only slightly longer than the second. Wings grayish hyaline, the costal portion beyond the base of the submarginal cell extending from the costa to the fourth vein brown, the limits not sharply defined, second basal cell slightly shorter than the first, anal cell wholly wanting. Front femora only slightly thicker than the others. 3-4 mm.

Behring Island (Stejniger).

Tachydromia corticalis sp. nov.

Male. Length 3.5 mm.—Black species covered with fine brown gray dust. Occiput grayish, with a few black bristles above and numerous white hairs below; front brownish. Antennæ yellow at the base, the outer joint and its seta infuscated. Proboscis reddish, with the tip darkened; palpi white, with a strong black preapical hair. Thoracic notum covered with brown-gray dust, the large humeri, the pleuræ and scutellum with more cinereous dust, scutellum with two erect widely separated bristles. Abdomen flattened, hypopygium large, shining black, globose, the copulatory portion twisted to the right, asymmetrical, consisting mainly of two large lamellate pointed valves, the one on the right with a bunch of short black hairs on its upper side, clasping a complicated short central piece bearing a short fringe of forward extending hairs, the last ventral is provided with a series of long black hairs. Coxæ and legs shining, piceous, front ones lighter, the four anterior femora swollen, of nearly equal thickness, front femora unarmed, ornate with two circular black spots on inner side below, one at the middle, the other half-way towards the apex; front tibiæ slightly thicker than the middle ones, armed beneath with a series of equidistant black setulæ, front metatarsi also with minute setulæ below; base of middle femora with a rough pencil of black bristles fitting into the excised tip of the middle tibiæ, middle tibiæ in length equalling their femora, provided with close minute setulæ on the under side; hind legs slender, their knees, middle part of tibiæ and base of metatarsi dull yellowish. Halteres dirty white. Wings and veins blackish on outer two-thirds, basal third whitish, anal vein vanishing at its tip, much recurved, the distance between the central cross-veins slightly less than the length of one of them, anterior cross-vein rather oblique, posterior cross-vein perpendicular.

Two males; Cloudcroft, New Mexico, June 19, 1902.

Mr. Viereck took these specimens, together with a series of *Tachydromia rapax*, running up and down the smooth trunks of the quaking aspen (*Populus tremuloides*), somewhat after the manner of the dolichopodid genera *Medeterus* or *Neurigona*.

Tachydromia brachialis sp. nov.

Male. Length 4 mm.—Black species covered with cinereous dust except sides of thorax. Front and occiput cinereous dusted, lower occiput nearly devoid of white hairs. Antennæ yellow, the seta black. Proboscis reddish except the extreme dark tip, palpi white, provided with a single black apical hair. Humeri large, concolorous with the remainder of the dorsum, scutellum with two erect bristles, pleuræ shining black. Abdomen lightly cinereous dusted, the last segment and the globose hypopygium shining black, upper valves of hypopygium small, bristly, especially the right one, last ventral fringed with moderately long black hairs. Coxæ and legs yellowish, front coxæ with a fringe of hairs beneath, their forward side and the under side of the posterior trochanters with a black spot. Front femora with a black transverse dumb-bell-shaped mark at the middle of the under side, below which is a large elongate curved black space which spreads straight downward to the inferior edge along its lower loop; under side of the front tibiæ and of the hind femora piceous, hind tibiæ fuscous, tarsi infuscated apically; front femora incrassate, ciliate beneath with a double series of conspicuous dusky hairs, front tibiæ slightly incrassate, not setulate but provided with a number of fine short hairs, front metatarsi with minute setulæ; middle and hind femora slender, simple, middle tibiæ slightly surpassing the femora, scarcely indented towards tip. Halteres lightly infuscated. Wings infumated, darker beyond basal third, veins black, all the cross-veins straight, perpendicular, the distance between the central cross-veins equal to the length of the posterior one, anal cross-vein abrupt.

Described from one male taken by Mr. George M. Greene, September 9, 1901, at Boonton, N. J. This may possibly be the insect Mr. Walker described as *similis,* though from his description alone it is impossible to decide. It is a finely characterized species easily distinguished by the fringe on the front femora, which well merits the redescription should it eventually proove to be Mr. Walker's species.

Page 230. **Coloboneura inusitata** mihi.

In the collection at Cambridge are two females from Rhode Island. They differ in no essential way from the description of the males. The humeral callostity is concolorous with the remainder of the thorax. The costa has a basal bristle rather longer than the others.

Page 232. **CHIROMANTIS** Rondani.

Small, slender, sparsely hairy species of light yellow color. Antennæ short, three-jointed, the third joint ovate, with the seta bent downward. Proboscis shorter than the head. Eyes of female separated. Thorax rather prominently raised. Abdomen of male blunt at tip, of the female with a porrect two-styled ovipositor. Legs lengthened, front coxæ as long as the thickened femora. Wings long and narrow, third vein simple, discal cell present, with three veins issuing from it, or wanting, in which case the fourth vein is forked, anal cell shorter than the second basal, anal angle not filled. (Taken from Schiner's description of *Thamnodromia*).

The genus is related to *Litanomyia,* which differs in having the thorax longer and more cylindrical, and the anal cell not shorter than the second basal.

Chiromantis vocatoria Fallen.

Fallen, Empid., p. 12, No. 15.

Head black. Antennæ yellow, the apex black; the long bristle-like seta white. Front white. Thorax yellow, infuscated above. Abdomen blackish, the venter pale. Legs pale, hind ones simple. Wings hyaline, the first vein short, second vein lengthened, third vein reaching the wing-margin at the extreme tip, fourth and fifth veins equal, forming the long discal cell, from which three veins reach the margin. The hind margin is fringed and rather stout.

This European species is given by Mr. Coquillett in Smith's "List" as from New Jersey.

SCIODROMIA Haliday.

Small, black, almost bare species. Antennæ short, two-jointed, the outer joint ovate, pointed, with a long bristle. Proboscis about as long as the head, fleshy, vertical or projecting forward. Palpi small, appressed to the proboscis. Eyes of both sexes nearly contiguous below the antennæ, widely separated above, the front very broad. Thorax moderately large. Hypopygium of male larger than the diameter of the abdomen, tip of the female abdomen blunt, ciliated. Legs slender, nowhere thickened. Wings long and narrow, all the veins unforked, discal cell moderately large, sending three veins to the wing-margin. Anal cell as long as the second basal, its cross-vein perpendicular. Wings not projecting at the anal angle.

The only important character in which the following species differs from the European type is in the structure of the front, which in Haliday's species is obliterated by the contiguity of the eyes of the male. *Sciodromia* can readily be separated from its near relatives by the following important characters.

Oreothalia has the anal cross-vein parallel with the hind margin.

Synamphotera bicolor has the proboscis incurved.

Ardoptera has the third vein furcate and the head long and narrow.

Sciodromia pullata sp. nov.

Male and Female. Length 2.5–3 mm.—Black species. Vertex, notum and hypopygium covered with olivaceous brown dust, occiput, pleuræ, abdomen and legs with rather more cinereous dust. The narrow face dusted with whitish. Arista slightly longer than the antennæ. Vertex and dorsum of thorax with very few short bristles, scutellum with two bristles. Hypopygium compressed, vertical, twice as deep as the abdomen. Legs slender, black, not spinose or bristly, ungues and pulvilli minute. Halteres yellow. Wings slender, evenly infumated, no stigmal darkening, veins blackish, second and third veins subparallel toward tip, anal vein evanescent beyond anal cell.

Two males and three females taken in sweepings near the summit of the Las Vegas Range, New Mexico, June 28, 1902 (altitude 11,000 feet), by Mr. H. L. Viereck.

Page 240. Modify table of **CLINOCERA.**

2. Discal cell very oblique apically; two submarginal cells....................3.
Discal cell moderately broad toward tip....................................4.
3. Second submarginal as long as second basal cell............**simplex** Loew.
Second submarginal longer....................................**lepida** mihi.
4. Stigma obsolete..5.
Stigma distinct...6.
5. Anal vein strong....................................**dolicheretma** mihi.
Anal vein faint.......................................**conjuncta** Loew.

Page 242. **Clinocera conjuncta** Loew.

Although the description states that the discal cell is small and apically very oblique, the type shows it to be of other conformation. The contact with the second posterior cell is quite broad. Hence *taos* turns out to be closely allied. The first and second posterior cells are of almost equal width at their proximal end. The first section of the front border of the discal cell is slightly over one third the length of the second section. The thorax is olivaceous except a median cinereous stripe between the two black vittæ. The stigmal darkening is scarcely visible.

Page 252. **SYNECHES** Walker.

Modify table thus:

6. Stigma quadrangular......................**quadrangularis** Wh. et Mel.
Stigma elliptical, diffused...7.
7. Wings grayish; legs comparatively simple............**debilis** Coquillett.
Wings brown, hind femora spinose beneath........**longipennis** sp. nov.

The white pollinose spots of the thorax of *albonotatus* are best seen when looked at from above.

Syneches longipennis sp. nov.

Male. Length 6 mm.—Rather large, slender species of black body-color. Eyes wine-red, occiput dusted with cinereous. Antennæ, palpi, and proboscis yellow. Thorax and abdomen thinly overlaid with cinereous dust, moderately coated with yellow hairs, thorax relatively little raised, evittate, scutellum with about fifteen hairs; abdomen slender, hypopygium small, terminal, sessile. Coxæ piceous, legs reddish, hairy, hind femora greatly thickened, spinose below and with four spinous bristles on upper-outer edge, last tarsal joint black. Halteres infuscated. Wings brown, narrow, stigma but little darker, veins piceous-brown, marginal cell not widened.

One male; Hertford Co., N. Car., June 9, 1895. (C. W. Johnson).

In stature this species resembles *thoracicus* and *rufus*, but differs conspicuously in the smaller thorax, more elongate abdomen, and different venation. From the smaller species *longipennis* is at once distinct by its bristly femora and darkened wings.

Page 256. **Oedalea ohioensis** mihi.

This is the species given in the New Jersey "List" as *stigmatella* Zett. The following notes made from the New Jersey specimen may be of service. Antennæ two-jointed, the first joint minute, the outer joint large, broad, blunt, equalling the eye-height, the arista minute. Scutellum with four bristles. Legs testaceous. Halteres pale yellow. Stigma very weak, the interstitial vein reaching two-thirds the distance to the margin. Another female differs from the New Jersey specimen in that the wings are nearly clear and the interstitial vein is perfect.

Page 256. **EUTHYNEURA** Macquart.

Discal cell open, fourth vein furcate........................**aperta** sp. nov.
Discal cell normal..2.
2. Discal cell large, *i. e.*, last section of the fifth vein not more than two-thirds the length of the preceding section........................3.
Discal cell smaller, the two sections of the fifth vein nearly equal........6.
3. Proboscis at least one-half the height of the head; scutellum with eight or more hairs. Western species........................4.
Proboscis not projecting; scutellum with four hairs. Eastern species **nura** sp. nov.
4. Black species..5.
Yellow species, with a median vitta brown............**crocata** Coquillett.
5. Highly polished species........................**flavipilosa** Coquillett.
Opaque species..**stentor** sp. nov.
6. Proboscis projecting forward, rigid..................**bucinator** sp. nov.
Proboscis minute, fleshy..7.
7. Outer joint of antennæ circular large; basal cells small...**bulbosa** sp. nov.
Outer joint of antennæ slender, long; second basal cell large. **atripes** sp. nov.

The North American species included in this genus belong more properly with the Empidinæ as they are here defined, but they show a transition toward the Hybotinæ in that the thorax is greatly arched, the anal cross vein is not so strongly inclined as usually is the case in the Empidinæ, and the proboscis of some of the species at least, projects forward.

Euthyneura bucinator sp. nov.

Female. Length 2.5 mm.—Shining black species with yellow legs. Face and front broad, diverging, shining. Proboscis rigid, black, extending obliquely forward, as long as the height of the head. Thorax bare, highly polished, including the pleuræ; scutellum with six black bristles. Abdomen subshining, brownish towards base. Coxæ and legs yellow, simple, slender, the claws minute. Halteres yellowish. Wings clear hyaline, veins yellow, no stigma, discal cell as long as the second basal, its hind border as long as the outward continuation of that vein, anal vein faint.

One female; Pennsylvania. The antennæ are broken. This is a typical *Euthyneura*: the five other new species conform less perfectly.

Euthyneura aperta sp. nov.

Male. Length 2.5 mm.—Slender black species, with yellowish legs. Head large, eyes contiguous, the upper facets large. Antennæ inserted low, the second joint broad lanceolate, the style minute. Proboscis rigid, extending straight forward, nearly as long as the head-height. Thorax sparsely pubescent, shining on the pleuræ also; scutellum with six equally long bristles. Abdomen slender, pubescent with whitish to dusky hairs and bristles, sides of first segment with a fringe of white hairs; hypopygium small, simple, narrow, obliquely ascending, black-pubescent. Coxæ and legs yellow, their short sparse hairs black. legs simple, slender, the hind tibiæ slightly thickened, claws and pulvilli small. Halteres pale yellow. Wings hyaline with a faint opalescence, veins white, stigma almost obsolete, whitish, second basal cell broad, discal cell open apically, the fourth vein forked midway its length, anal vein faint, vanishing.

A single male; Cloudcroft, New Mexico. May 27, 1902. (H. L. Viereck).

This species is placed in *Euthyneura* as it departs from typical forms in no more salient characters than do the other species here included. In other genera, e. g., *Thamnodromia*, *Hemerodromia*, or *Rhamphomyia*, the discal cell is often incompletely formed.

Euthyneura stentor sp. nov.

Male. Length 3. mm.—Opaque black, rather slender species. Head rather large, eyes broadly contiguous, facets large above. Antennæ short, inserted low, the second joint elongate conical, suddenly narrowed at the base and then gradually tapering, style short, plainly two-jointed, the first joint thick. Thorax covered with long bristly black hairs; scutellum with ten long hairs. Abdomen cylindrical, deflexed, pubescent with sparse hairs; hypopygium small, consisting of two small deflexed black-bristly valves, and a central forward-extending, trumpet-shaped piece. Legs slender, moderately long, the femora ciliate above and beneath with regular sparse hairs, claws and pulvilli conspicuous. Halteres black. Wings lightly infumated, stigma elliptical blackish, veins narrow, blackish, the intercalary vein arises near the fourth posterior vein, discal cell one-third longer than the enlarged second basal, its posterior border one-half longer than the outer continuation of that vein, anal cross vein parallel with the hind border of the wing, forming an even continuation of the vein bounding the second basal cell, anal vein completely obsolete.

One male; Cloudcroft, New Mexico, May 27, 1902. (H. L. Viereck.)

Euthyneura nura sp. nov.

Female. Length 3 mm.—Shining black with reddish legs. Eyes nearly contiguous on the face; front of moderate width. Proboscis and palpi minute, black. Antennæ black, shorter than the head-height, the outer joint compressed, large, two-thirds as deep as long, its style one-third its length. Thorax with spare hairs, notum and pleura strongly polished, scutellum with four dusky hairs. Abdomen slender, polished black, its sparse pubescence dusky. Coxæ and legs yellowish, simple, rather strong, rather densely pubescent, the tips of the hind tibiæ and of the tarsi somewhat dusky, claws and pulvilli small but plain. Halteres yellowish. Wings cinereous hyaline, with broad dusky yellow veins, stigmal spot dusky, filling out the tip of the marginal cell, second vein straight, widely diverging from the third, discal cell one-third longer than the second basal, the vein between the third and fourth posterior cells two-thirds that between the discal and fourth posterior cells, anal vein faint.

One female; Massachusetts.

Euthyneura bulbosa sp. nov.

Male. Length 1.5–2 mm.—Opaque black. Eyes contiguous on the front, upper facets larger. Proboscis short and fleshy, reaching forward. Antennæ short, the second joint large, compressed, circular, the style shorter than the radius of the joint. Thorax very large, provided with short black bristles, scutellum with four long black bristles. Abdomen short, blunt, black-bristly, venter gray pruinose, hypopygium not formed. Legs short and slender, simple, black, tarsi with short bristles, claws small, pulvilli minute. Halteres black. Wings short and broad, cinereous hyaline, veins fuscous, stigma nearly obsolete, discal cell one-third longer than the second basal, the basal cells not enlarged, anal cross vein nearly parallel with the hind margin of the wing, anal vein evanescent, reaching three-fourths to the margin.

Female.—Eyes widely separated. Thorax, abdomen, halteres and legs except tip of tarsi, reddish yellow. Veins reddish. Abdomen pointed.

Numerous specimens collected by Mr. J. Chester Bradley, in net-sweepings, in Chester Co., Pa., during the early part of last June.

Euthyneura atripes sp. nov.

Female. Length 2 mm.—Black species. Head opaque black, face narrow, sides of front parallel, separated as widely as the posterior ocelli. Proboscis short, fleshy, extending forward. Antennæ as long as the height of the head, the outer joint five times as long as deep, slender, not much tapering, its arista equalling its depth. Thorax shining, nearly bare, pleuræ and abdomen lightly dusted with cinereous; scutellum with ten black hairs. Coxæ and legs black, simple, legs slender, a row of scattered hairs along the under edge of the femora, claws and pulvilli large, empodium minute. Halteres black. Wings large, cinereous hyaline, veins fuscous, a diffused brown stigmal spot present, discal cell as long as the second basal, its hind border about three-fourths as long at the outer continuation of that vein.

A single specimen from Los Angeles Co., California, December 22, 1896. (W. M. Wheeler).

Page 259. **MEGACYTTARUS** Bigot.

Although Mr. Coquillett claims that the mutilated specimen upon which this genus was founded is the same as *Rhamphomyia limbata* Loew, the suppression of the genus seems hardly justifiable on the slight evidence he gives. It is true the diagnosis applies equally well to *Rh. limbata*, but *Megacyttarus* is grouped by M. Bigot with *Ocydromia* which has a projecting proboscis and a truncate anal cell, characters of importance which M. Bigot would hardly overlook. Hence until more definite information is to be had concerning the type the genus and species may be reinstated.

"Allied to Ocydromia. It differs in the short basal cells and the very long, broad, roughly triangular discal cell which is closed by a greatly sinuous transverse vein placed near the hind margin of the wing."

Megacyttarus argenteus Bigot.

Bull. Soc. Ent. France, 1880, xlvii.

Female. Length 5 mm.—Cinereous, the four vittæ of the thorax, the proboscis, the whole of the legs, the extreme tip of the abdomen, and the small stigmal spot of the wings black; abdomen silvery; wings hyaline.

Colorado.

Page 264. **Hilara umbrosa.**

This is the species given in the New Jersey "List" as *Empis brachystoma* Coquillett MSS.

Page 285. Modify table of **EMPIS** as follows:

21. Pile of pleuræ and of abdomen in part pale, or wanting ....22.
Hairs of bristles of thorax and abdomen wholly black ....31.
22. Species of three mm., size; antennæ reddish at base... 23
Larger species ....24.
23. Abdomen more or less yellow; veins brown......... .**compta** Coquillett.
Abdomen wholly black; veins white.................... **varipes** Loew.
24. Knob of halteres black; abdomen largely shining.......................25.
Knob of halteres yellow; abdomen opaque pollinose....................26.
25. Mesonotal hairs white ....**comantis** Coquillett.
Mesonotal hairs black ....**brachysoma** Coquillett.

26. Woolly species; scutellum with many bristles.... **scatophagina** sp. nov.
Less pubescent species; scutellum with eight or fewer bristles..........27
27. Scutellum with six to eight bristles........................ **obesa** Loew.
Bristles of scutellum four or less..28.
28. Pile of body luteous.................................... **Aldrichii** mihi.
Pile of body white or wanting...29.
29. Species devoid of hairs; wings clear hyaline, sixth vein evanescent.
neomexicana sp. nov.
More or less pubescent species; sixth vein normal....................29*a*.
29*a*. Scutellum with two bristles; dorsum of abdomen brown pollinose; legs of female ciliate with black scales................ **captus** Coquillett.
Scutellum with four bristles...30.
30. Stigma brown, wings gray, abdomen blue-gray pollinose.
avida Coquillett.
Stigma wanting, abdomen more or less brownish above.................30*a*.
30*a*. Antennæ and proboscis yellow at base.............. **levicula** Coquillett.
Antennæ and proboscis black........................ **vaginifer** sp. nov.

Empis scatophagina sp. nov.

Male. Length 9 mm.—Stout black species, densely clothed with mixed yellow and dusky woolly pubescence, the darker hairs prevailing on the mesonotum. Eyes contiguous; facets uniform. Face covered with brown-gray pollen. Antennæ short, black, third joint lanceolate, one-third as wide as long, its style two-thirds its length. Palpi porrect, ribbon-like, luteous, with a few long black forward-extending hairs beneath. Proboscis slender, black, reaching to the tip of the middle coxæ. Occiput densely covered with dusky pubescence above and with yellowish below. Thorax with four narrow glabrous vittæ, the outer pair abbreviated behind, densely covered with pubescence, the darker hairs slightly longer and directed posteriorly, the lighter hairs shorter and straighter, especially on the humeri where the dense yellow hairs extend forward. Above the base of the wings and at the posterior end of the middle vittæ are bunches of black bristles; scutellum bearing about twenty bristles; metapleuræ with a dense mat of yellow hairs; pleuræ cinereous dusted. Abdomen cylindrical, stout, somewhat shining, with long dense yellow pubescence; no ventral projections; hypopygium comparatively small, outwardly fulvous, closed, globose, its lower valve with a fringe of yellow hairs, central filament hidden, except at base, middle lamellæ scarcely larger than upper ones. Coxæ black, dusted with gray and provided with yellow pubescence; middle and hind ones with a row of longer black hairs along outer side; trochanters black, shining. Legs dark castaneous, shining, not thickened, unarmed, provided with short black bristles; tarsi piceous, black apically. Halteres yellow. Wings lightly and evenly infumated, stigma faint, elongate and very narrow, veins narrow, dark brown, normal, anterior branch of the third vein oblique and curved, discal cell two-thirds as long as the ultimate section of the fourth vein.

Female.—Differs thus: eyes widely separated; pubescence shorter; front and hind edges of middle and hind femora ciliate with short black scale-like hairs; inner edge of hind tibiæ likewise fringed, but not so densely.

One male and one female. Sitka, Alaska, in the Loew collection in the Museum of Comparative Zoology, Harvard University.

This species is closely related to *obesa* Loew, but differs in the much denser vestiture of the body.

Empis neomexicana sp. nov.

Male and Female. Length of body 6 mm., of wing 9 mm.—Black species, finely dusted with brownish pollen, devoid of all pile and bristles, the extremely short and sparse pubescence of the body and legs whitish. Occiput gray dusted. Antennæ black, moderately long, the third joint lanceolate, its style short and thick. Palpi short, pale yellow; proboscis black, nearly three times the height of the head. Thorax with four brown vittæ, obliterated in front of the scutellum; scutellum and metapleuræ with no bristles. Abdomen cylindrical, the basal segments dusky yellowish in the male, hypopygium not large, erect, pedunculate by the flattened projecting basal piece, upper lamellæ fleshy, yellow, middle lamellæ black, triangular, their free ends touching and encircling a deflexed curved spur-like process, from the base of the forward side of the hypopygium arise a pair of long erect filiform reddish styles. Coxæ and legs yellow, hind legs from middle of femora outward dusky, legs simple and slender in both sexes. Halteres yellow. Wings hyaline, veins dark brown, thin, stigma faint, elongate, situated far from the tip of the marginal cell, which extends considerably beyond the furcation of the third vein, second section of the front border of the discal cell five times the length of the first section, its hind border equal to the outward continuation of that vein, anal vein wanting in the male, evanescent in the female.

One male and one female from the top of the Las Vegas Range, New Mexico, June 28, 1902, altitude 11,000 feet. (H. L. Viereck).

Empis vaginifer sp. nov.

Male. Length 5 mm.—Black, thickly overlaid with fine silvery-gray dust. Eyes broadly contiguous above the antennæ, facets uniform and small. Face with brownish dust. Antennæ short, black, not bristly, the third joint twice as long as broad, its arista equal to its breadth. Palpi slender, short, yellow; proboscis nearly twice the height of the head, black. Occiput gray dusted, with two irregular rows of sparse short black bristles above, and below with a small bunch of fine white hairs on each side in back of the cheeks. Thorax dusted with gray, almost devoid of hairs, the acrostichals and dorsi-centrals short and sparse, humeral and lateral bristles stronger; notum provided with four rather broad slaty-brown vittæ; scutellum with four short bristles; pectus with a few white hairs; metapleuræ with a fine bunch of white hairs. Abdomen depressed, cinereous-dusted, the basal segments provided with sparse white hairs laterally; the seventh dorsal segment strongly convex, almost hemispherical, the eighth minute, together with the small hypopygium hidden within the large tubular testaceous eighth ventral segment, which is produced at its upper basal angles into two stout cylindrical processes articulating with suitable callosities on the sixth dorsal. Coxæ rufous, but overlaid with cinereous dust, provided outwardly with a few short bristles, those of the base of the front ones whitish, the others black. Legs rather shining, testaceous, their bristles small, the outer ends of the tarsal joints somewhat more dusky; tarsal joints evenly decreasing in length, the front and middle tarsi cylindrical, the hind metatarsi and hind tibiæ as thick as the femora, the inflation of the tarsus gradually subsiding apically; pulvilli reddish. Halteres large, yellow. Wings clear hyaline, stigma wanting, the veins pale brown, normal, third vein furcate beyond the marginal cell, the hind border of the discal cell two-thirds the length of the outward continuation of that vein.

One male, District of Columbia. In the Osten Sacken Collection at the Museum of Comparative Zoology, Cambridge, Mass.

Page 298. **Empis longipes** Loew.

In the male the tips of the front coxæ, the forward side of the middle ones and the outer half of the hind ones, together with the underside of the hind trochanters are provided with conspicuous black bristles. The hind trochanters are bordered apically with black. In the female, the hairs are shorter and the black of the trochanters is reduced to a spot. The male hypopygium is densely covered with fine dusky hairs on the outer portion of the middle lamellæ, while the lower valve is fringed with fine black bristles.

Page 301. **Empis armipes** Loew.

The armament of the hind legs of the male is much like that of *mixopolia*.

Page 304. **Empis stenoptera** Loew.

Dr. Loew makes no mention of an important secondary sexual character of this species. The underside of the hind trochanters of the male is provided with a fringe of black spiny scales, which places the species in a group with *nuda* and *cacuminifer*.

Page 309. **Empis obesa** Loew.

This species measures eight mm. instead of three as given in the Centuries. Having been led astray by this fact, Mr. Coquillett established his *ravida* upon the same form.

Page 322.

The dubious *poplitea* is the same as *serperastrorum*, the description of which will have to go under the name of Loew's species.

Page 330. **Empimorpha comantis** Coquillett.

A male and a female, also from San Francisco, collected by Mr. H. Edwards, are in the Loew collection at Cambridge. The male is typical, but the female departs from Mr. Coquillett's type. In this specimen the hirsuteness of the body is much reduced, on the face almost completely disappearing, and elsewhere shorter and sparser than in the male. The chætotaxy of the coxæ is similar for both sexes. Both also have a series of short black bristles on the underside of the middle and hind femora. The structure of the hypopygium, as well as the whole habitus, suggests the group *obesa* of *Empis*, which, in consideration of the nearly glabrous face, renders the validity of Mr. Coquillett's genus somewhat precarious.

Page 332. **Iteaphila orchestris** sp. nov.

Male and Female. Length 5 mm.—Deep opaque black over all, the thorax of the female with dark brown dust, rather hairy species. Eyes of the male contiguous on the front, of the female very widely separated. Antennæ equalling the height of the head, first two joints moderately large, barrel-shaped, with but few hairs, third joint twice as long as basal two, elongate-lanceolate, not much tapering, blunt, its short arista two-jointed, the first joint thick, the second minute. Proboscis about as long as the head-head, extending straight forward, stouter than in *peregrina*, palpi slender, equalling the proboscis in length, and applied to it, provided with numerous black hairs. Face bare, occiput covered with dense black pubescence. Thorax moderately pubescent, the hairs sparser and longer posteriorly, the pubescence wanting on two vittæ of piceous color, scutellum with a fringe of about twenty long hairs; abdomen moderately pubescent basally. The vestiture of the female is much reduced, and not of such a deep black color. Genitalia of the male small, consisting of several projecting filamentous appendages. Legs slender, the knees sometimes brownish, the femora of the male with regular sparse black cilia above and below. Halteres black, the pedicels yellowish in the female. Wings of the male rather pointed, very lightly infumated, stigma elongate, narrow, smoky, veins black, third vein furcate quite a distance beyond the tip of the marginal cell, the submarginal cell therefore small; of the female, the wings are hyaline, the veins dark fuscous, becoming yellow at the base, the apex is blunter, while the third vein is furcate just beyond the end of the marginal cell, stigma faint.

Described from numerous specimens taken by Mr. H. L. Viereck, June 28, 1902, near the top of the Las Vegas Range, New Mexico, at an altitude of 11,000 feet. The species differs apparently from *macquarti* in that the veins are not at all bordered with brown, and the third antennal joint is not oval. From *peregrina* it can be readily distinguished by the hirsute body and shortened proboscis.

These flies were swarming over a small creek-bed in an anæmotropic dance so characteristic of many of the members of this subfamily.

CATALOGUE OF THE NORTH AMERICAN SPECIES OF EMPIDIDÆ.

MYTHICOMYIINÆ.

Mythicomyia Coquillett.

Rileyi *Coq.* Calif.
tibialis *Coq.* Calif.

Hilaromorpha Schiner.

Mikii *Willist.* Ill.
obscura *Big.* Calif.

TACHYDROMIINÆ.

Phoneutisca Loew.

bimaculata *Lw.* Alaska, S. Dak. Fig. 1.
simplicior *Wh. et Mel.* Mex. Fig. 6.

Stilpon Loew.

varipes *Lw.* Penn.
Houghii sp. nov. Mass. Figs. 2, 3.
pectiniger sp. nov. Mass., Wisc. Figs. 4, 5.
minuta sp. nov. N. Mex.
nigripes sp. nov. N. Mex.

Drapetis Meigen.

unipila *Lw.* Tex., Cal. Figs. 10, 14, 21.
medetera sp. nov. Colo., Ariz., Wyom. Fig. 22.
nigra *Meig.* S. Dak. Figs. 12, 17, 24.
dividua sp. nov. Id. Figs. 16, 18, 23.
latipennis sp. nov. Wis., Ks. Figs. 11, 19.
apicis *Willist.* St. Vincent.
pubescens *Lw.* N. Y.
divergens *Lw.* Ga., Ala., Tex. Fig. 15.
minuta *Willist.* St. Vincent.
femoralis *Wh. et Mel.* Mex. Fig. 13.
septentrionalis sp. nov. Mich.
spectabilis sp. nov. Mass., Tex. Figs. 9, 20.
gilvipes *Lw.* Tex., St. Vincent, Ga.
flavida *Willist.* Yucatan, Mex., W. Ind., La.

Elaphropeza Macquart.

montana sp. nov. Colo. Figs. 7, 8.

Platypalpus Macquart.

trivialis *Lw.* Me., Mass., D. C. Figs. 26, 34, 43.
caligatus sp. nov. Mex. Figs. 27, 35, 46.
lupatus sp. nov. N. M.
pachycnemus *Lw.* D. C., N. J.
monticola sp. nov. Col. Fig. 41.
pluto sp. nov. Id., Cal. Fig. 39.
apicalis *Lw.* Penn., N. Y., Mass.
diversipes *Coq.* Alaska.
incultus *Coq.* Cal., Tex.
tersus *Coq.* N. Car., Ga., La.
impexus sp. nov. Mich., S. Dak.
lætus *Lw.* N. H.
flavirostris *Lw.* N. H.
mesogrammus *Lw.* N. J., D. C., Penn., Tenn.
vicarius *Walk.*
canus sp. nov. Cal. Figs. 29, 40, 45.
hians sp. nov. Col. Figs. 32, 36, 37.
inops sp. nov. Wyom., Id.
incurvus sp. nov. Cal. Figs. 31, 33, 34.
gravidus sp. nov. Cal. Figs. 25, 42.
lateralis *Lw.* N. H.
discifer *Lw.* D. C.
hastatus sp. nov. Ks., Id., N. Mex. Fig. 30.
æqualis *Lw.* Mass., Quebec, Id., La., Cal.
crassifemoris *Fitch.* Mass., Mich., Id., Penn.
tenellus sp. nov. Ill., S. D. Figs. 28, 38.
gilvipes *Coq.* Alaska.
rufiventris sp. nov. N. Mex.
Vierecki sp. nov. N. Mex.

Tachydromia Macquart.

Schwarzii *Coq.* Tex., Mex., Id. Wyom., Cal. Fig. 52.
enecator sp. nov. Quebec, Wyom.
bacis *Walk.* Jamaica.
vittipennis *Walk.*
inusta sp. nov. N. Mex., Id. Figs. 50, 54.
portæcola *Walk.* H. Bay.
Winthemi *Zett.* N. H.
postica *Walk.* Ks. Fig. 53.

fenestrata *Say.* Mid. States.
similis *Walk.* H. Bay.
maculipennis *Walk.* H. Bay.
clavipes *Lw.* Ill.
pusilla *Lw.* Mass., N. J., Ill. Fig. 51.
rostrata *Lw.* N. H., Mass.
rapax *Lw.* Mass., Ind., Wis., Wyom., N. Mex. Fig. 55.
nubifera *Coq.* Bering Is.
corticalis sp. nov. N. Mex.
brachialis sp. nov. N. J.

Colobonenra gen. nov.

inusitata sp. nov. Fla., Mass., R. I. Figs. 47–49.

HEMERODROMIINÆ.

Hemerodromia Meigen.

scapularis *Lw.* Me., Penn., Md., Tenn., Wyom., N. Mex. Fig. 59.
mexicana sp. nov. Mex. Figs. 56, 60.
collusor sp. nov. Col., Wyom. Figs. 57, 58, 64.
defecta *Lw.* D. C., N. J.
superstitiosa *Say.* N. W. Terr., Fla.
rogatoris *Coq.* N. C., La., Queb., Wis., Wyom. Fig. 65.
empiformis *Say.* Pa., Fla., N. J., Ill., St. Vincent? N. Y.?
defessa *Willist* St. Vincent.
captus *Coq.* N. Y.
albipes *Walk.* H. Bay Terr.
notata *Lw.* Ill.
valida *Lw.* H. B. Terr.
præcatoria *Fall.* H. Bay Terr.
obsoleta *Lw.* Ill.
palloris *Coq.* N. H.

Litanomyia gen. nov.

mexicana *Wh. et Mel.* Mex.
elongata sp. nov. Mass., Can. Wis., S. D.

Chiromantis Rondani.

vocatoria *Fall.* N. J.

Synamphotera Loew.

bicolor *Lw.* Alaska.

Oreothalia gen. nov.

pelops sp. nov. Id.

Sciodromia Haliday.

pullata sp. nov. N. Mex

Rœderiodes Coquillett.

juncta *Coq.* N. Y.

Ardoptera Macquart.

irrorata *Fall.* Europe, N. Am.

Clinocera Meigen.

simplex *Lw.* H. Bay Terr.
lepida sp. nov. Id.
dolicheretma sp. nov. Id.
conjuncta *Lw.* D. C.
taos sp. nov. N. H.
lecta sp. nov. Id.
binotata *Lw.* N. Y., Quebec.
maculata *Lw.* D. C.
lineata *Lw.* Penn., Wash. Figs. 61, 62.
fuscipennis *Lw.* N. H.
maculipes *Big.* Cal.

HYBOTINÆ.

Meghyperus Loew.

occidens *Coq.* Cal.
nitidus sp. nov. Id. Figs. 72, 73.

Syneches Walker.

albonotatus *Lw.* D. C.
hyalinus *Coq.* Md.
pusillus *Lw.* W. Ind., N. Y., Wis., Ks., Fla.
debilis *Coq.* Ga., D. C., Md.
quadrangularis *Wh. et Mel.* Mexico. Fig. 85.
rufus *Lw.* N. Y., Ohio, Ill., Wis.
thoracicus *Say.* Pa., N. C., Ky., Ill. Fig. 84.
simplex *Walk.* Mass., N. C., Ga., Fla., Wisc., Ont. Fig. 86.
longipennis sp. nov. N. C.

Syndyas Loew.

dorsalis *Lw.* N. Y., Ill.
polita *Lw.* Mass., La., Ks. Fig. 83.

Hybos Meigen.

typicus *Wh. et Mel.* Mex.
spinicosta *Wh. et Mel.* Mex. Fig. 77.
mellipes *Wh. et Mel.* Mex. Fig. 78.
electus nom. nov. W. Ind., Mass., La., Fla.
Slossonæ *Coq.* Mass., N. H., Wis.
reversus *Walk.* N. J.
triplex *Walk.* Yucatan, Mex., Mass., Fla., Col. Fig. 79-81.
sequens nom. nov. Mex.

Oedalea Meigen.

ohioensis sp. nov. Ohio, N. J. Figs. 74-76.

Leptopeza Macquart.

flavipes *Meig.* Va. (Europe). Fig. 68.
disparilis sp. nov. Cal., Id. Fig. 69.
compta *Coq.* Mass., Ohio, Wis., Ill., Tenn. Fig. 70.

Ocydromia Meigen.

glabricula *Fall.* Wis., Wyom., N. Mex., Vanc. Figs. 66, 67.

Megacyttarus Bigot.

argenteus *Big.* Col.

Brachystoma Meigen.

Robertsonii *Coq.* Ohio, Tenn., Ill.
occidentalis sp. nov. Id., Wash. Fig. 80.

Blepharoprocta Loew.

nigrimana *Lw.* Ill.
binummus *Lw.* D. C., Ohio. Figs. 91, 92.
serratula *Lw.* Ga., Tenn. Fig. 90.

EMPIDINÆ.

Empimorpha Coquillett.

barbata *Lw.* Cal. Fig. 106.
comantis *Coq.* Cal.
geneatis sp. nov. Cal. Fig. 105.

Pachymeria Stephens.

pudica *Lw.* D. C., Va., Penn., N. J., Cloudcroft, N. Mex.
brevis *Lw.* D. C.

Empis Linneaus.

annulipes *Wh. et Mel.* Mex. Fig. 115.
montezuma *Wh. et Mel.* Mex. Fig. 114.
bicolor *Bell.* Mex. Figs. 112, 113.
atrifemur *Wh. et Mel.* Mex. Figs. 116, 117.
azteca *Wh. et Mel.* Mex. Fig. 119.
pegasus *O. S.* Mex.
xochitl *Wh. et Mel.* Mex. Fig. 118.
totipennis *Bell.* Mex.
spiloptera *Wied.* Mex.
clausa *Coq.* Tex., S. D., Ill., Ohio. Fig. 129.
asema sp. nov. Tex. Fig. 130.
triangula *Coq.* Alaska.
labiata *Lw.* D. C.
distans *Lw.* Conn., Penn., La., Ga. Fig. 127.
dolorosa *Wh. et Mel.* Mex. Fig. 128.
cormus *Walk.* H. Bay Terr., Col. ?
luctuosa *Kirby.* Brit. Am.
gulosa *Coq.* Ill.
humile *Coq.* Ill.
poeciloptera *Lw.* N. Y.
longipes *Lw.* N. Y., Penn
sordida *Lw.* D. C.
abcirus *Walk.* Ga.
eudamidas *Walk.*
amytis *Walk.* N. Y.
ollius *Walk.* N. Scot.
laniventris *Esch.* Unalaska, Bering Is., Copper Is.
colonica *Walk.* N. Scot.
leptogastra *Lw.* D. C.
armipes *Lw.* N. Y.
tridentata *Coq.* Penn. Fig. 132.
pallida *Lw.* N. Y.
rufescens *Lw.* N. H., Mass. Fig. 120.
rubida *Wh. et Mel.* Mex. Fig. 121.
otiosa *Coq.* Ill., Conn., Ks., La., Mass. Fig. 122.
Johnsoni sp. nov. Penn. Fig. 123.

enodis sp. nov. Ill. Fig. 125.
cacuminifer sp. nov. Ohio, Ala. Fig. 124.
stenoptera *Lw.* N. H.
nuda *Lw.* Ill., Montreal. Fig. 126.
compta *Coq.* Ill., La.
varipes *Lw.* Pa.
levicula *Coq.* Ill.
neomexicana sp. nov. N. Mex.
vaginifer sp. nov. D. C.
scatophagina sp. nov. Alaska.
avida *Coq.* Ill.
comantis *Coq.* Cal.
brachysoma *Coq.* Alaska. Fig. 110.
Aldrichii sp. nov. Id., Oreg. Fig. 110.
obesa *Lw.* N. H., Mass., Ga., Id., Wash. Fig. 111.
captus *Coq.* N. Car., Ga.
tersa *Coq.* N. Car.
tenebrosa *Coq.* Tex.
spectabilis *Lw.* Md., N. J. Pa. Fig. 109.
lævigata *Lw.* N. H.
virgata *Coq.* Wash., Br. Col. Fig. 108.
pellucida *Coq.* Alaska.
fumida *Coq.* Alaska.
infumata *Coq.* Alaska.
cæligena sp. nov. Ala. Fig. 107.
teres sp. nov. Id. Figs. 133, 142.
loripedis *Coq.* Ill., Ohio, Penn. Fig. 131.
gladiator sp. nov. Ks. Fig. 134.
arthritica sp. nov. Pa. Figs. 135, 144.
podagra sp. nov. Id.
mira *Big.* Cal.
Bigoti nom. nov. Cal.
manca *Coq.* Cal.
valentis *Coq.* Cal. Fig. 138.
clauda *Coq.* Alaska.
poplitea *Lw.* Alaska, Vanc., Id., Col., N. Mex. Figs. 136, 145.
aerobatica sp. nov. Cal., Id.
nodipes sp. nov. N. Mex. Fig. 143.
dolabraria sp. sp. Cal.
falcata sp. nov. Id., Cal., N. Mex. Fig. 137.
canaster sp. nov. Id., Oreg. Figs. 139, 140.
æripes sp. nov. Id. Fig. 141.
mixopolia sp. nov. Id.

Hilara Meigen.

viridis *Coq.* Jamaica.
testacea *Lw.* N. H., N. J.
lutea *Lw.* D. C., N. J.
femorata *Lw.* N. J., N. Y., Md., Ohio, Wis.
aurata *Coq.* Me., Alaska.
umbrosa *Lw.* Mass., Ill.
basalis *Lw.* Ill.
quadrivittata *Meig.* Alaska.
leucoptera *Lw.* Fla., N. J.
bella sp. nov. Mass. Fig. 94.
macroptera *Lw.* D. C.
congregaria sp. nov. Cal.
Johnsoni *Coq.* Ala.
tristis *Lw.* N. H., N. J.
mutabilis *Lw.* Ill., N. J.
trivittata *Lw.* Ill., Ala., Tex.
nugax sp. nov. Cal.
cana *Coq.* Cal.
baculifer sp. nov. Ga. Fig. 96.
unicolor *Lw.* Mass., Md.
velutina *Lw.* D. C.
atra *Lw.* Mass., Ill., Col., N. Mex.
carbonaria sp. nov. Mass.
brevipila *Lw.* Ill.
gracilis *Lw.* Pa., N. J.
nigriventris *Lw.* Pa.
seriata *Lw.* N. H., N. J.
Wheeleri *Mel.* Wyom. Fig. 95.

Gloma Meigen.

rufa *Lw.* N. H.
obscura *Lw.* N. H., Id. Fig. 93.
scopifera *Coq.* Alaska.

Ragas Walker.

mabelæ sp. nov. Id. Fig. 98.
conjuncta *Coq.* Alaska.

Hormopeza Zetterstedt.

bullata sp. nov. Wyom. Fig. 88.
brevicornis *Lw.* S. Dak., Id., Wyom., Alaska. Fig. 87.
nigricans *Lw.* Id., Alaska.

Lamprempis Wheeler et Melander, gen. nov.

violacea *Lw.* Mex. Figs. 103, 104.

superba *Lw.* Cuba.
cyanea *Bell.* Mex.
suavis *Lw.* Mex.
chichimeca *Wh. et Mel.* Mex. Figs. 100, 101, 102.
diaphorina *O. S.* Mex.
benigna *O. S.*

Iteaphila Zetterstedt.

peregrina sp. nov. Cal. Fig. 97.
Macquart *Zett.* N. H., Quebec.
orchestris sp. nov. N. Mex.

Microphorus Macquart.

drapetoides *Walk.* H. Bay Terr.

Holoclera Schiner.

ravida *Coq.* Cal.
atrata *Coq.* Alaska.
sycophantor sp. nov. Id.
bilineata sp. nov. La. Fig. 99.

Euthyneura Macquart.

flavipilosa *Coq.* Br. Col.
crocata *Coq.* Alaska.
bucinator sp. nov. Penn.
nura sp. nov. Mass.
atripes sp. nov. Cal.
bulbosa sp. nov. Penn.
stentor sp. nov. N. Mex.
aperta sp. nov. N. Mex.

Cyrtoma Meigen.

halteralis *Lw.* D. C., Wis.
femorata *Lw.* N. H.
procera *Lw.* Alaska.
longipes *Lw.* Mass., Wyom., N. H., Ill., N. Mex. Fig. 71.
pilipes *Lw.* Ill.

EXPLANATION OF THE PLATES.

PLATE V.

Fig. 1. *Phoneutisca bimaculata* Lw., wing.
" 2. *Stilpon Houghii* sp. nov., antenna.
" 3. " " hypopygium.
" 4. " *pectiniger* sp. nov., wing.
" 5. *Elaphropeza montana* sp. nov., wing.
" 6. *Phoneutisca simplicior* Wh. et. Mel., wing.
" 7. *Elaphropeza montana* sp. nov., wing.
" 8. " " antenna.
" 9. *Drapetis spectabilis* sp. nov., wing.
" 10. " *unipila* Lw., wing.
" 11. " *latipennis* sp. nov., wing.
" 12. " *nigra* Meig., wing.
" 13. " *femoralis* Wh. et Mel., wing.
" 14. " *unipila* Lw., right hind leg.
" 15. " *divergens* Lw., wing.
" 16. " *dividua* sp. nov., wing.
" 17. " *nigra* Meig., antenna.
" 18. " *dividua* sp. nov., apical joint of antenna.
" 19. " *latipennis* sp. nov., antenna.
" 20. " *spectabilis* sp. nov., right antenna from above and inside.
" 21. " *unipila* Lw., outer side of the right antenna.
" 22. " *medetera* sp. nov., right antenna.
" 23. " *dividua* sp. nov., hypopygium.

Fig. 24. *Drapetis nigra* Meig., hypopygium.
“ 25. *Platypalpus gravidus* sp. nov., antenna.
“ 26. “ *trivialis* Lw., antenna.
“ 27. “ *caligatus* sp. nov., antenna.
“ 28. “ *tenellus* sp. nov., antenna.
“ 29. “ *canus* sp. nov., antenna.
“ 30. “ *hastatus* sp. nov., antenna.
“ 31. “ *incurvus* sp. nov., antenna.
“ 32. “ *hians* sp. nov., antenna.
“ 33. “ *incurvus* sp. nov., wing.
“ 34. “ *trivialis* Lw., wing of male.

PLATE VI.

Fig. 35. *Platypalpus caligatus* sp. nov., wing of male.
“ 36. “ *hians* sp. nov., head.
“ 37. “ “ wing of male.
“ 38. “ *tenellus* sp. nov., hypopygium.
“ 39. “ *pluto* sp. nov., wing.
“ 40. “ *canus* sp. nov., wing.
“ 41. “ *monticola* sp. nov., hypopygium.
“ 42. “ *gravidus* sp. nov., wing.
“ 43. “ *trivialis* Lw., hypopygium.
“ 44. “ *incurvus* sp. nov., hypopygium.
“ 45. “ *canus* sp. nov., hypopygium.
“ 46. “ *caligatus* sp. nov., hypopygium from above.
“ 47. *Coloboneura inusitata* sp. nov., head.
“ 48. “ “ wing.
“ 49. “ “ antenna.
“ 50. *Tachydromia inusta* sp. nov., wing.
“ 51. “ *pusilla* Lw., hypopygium.
“ 52. “ *Schwarzii* Coq., wing.
“ 53. “ *postica* Walk., hypopygium.
“ 54. “ *inusta* sp. nov., hypopygium.
“ 55. “ *rapax* Lw., hypopygium.
“ 56. *Hemerodromia mexicana* sp. nov., wing.
“ 57. “ *collusor* sp. nov., antenna.
“ 58. “ “ hypopygium.
“ 59. “ *scapularis* Lw., hypopygium.
“ 60. “ *mexicana* sp. nov., hypopygium.

PLATE VII.

Fig. 61. *Clinocera lineata* Lw., wing.
“ 62. “ “ antenna.
“ 63. *Litanomyia mexicana* Wh. et Mel., wing.
“ 64. *Hemerodromia collusor* sp. nov., hypopygium.
“ 65. “ *rogatoris* Coq., hypopygium.
“ 66. *Ocydromia glabricula* Fall., antenna.
“ 67. “ “ hypopygium.

Fig. 68. *Leptopeza flavipes* Meig., antenna.
“ 69. “ *disparilis* sp. nov., hypopygium.
“ 70. “ *compta* Coq., hypopygium.
“ 71. *Cyrtoma longipes* Lw., wing.
“ 72. *Meghyperus nitidus* sp. nov., antenna.
“ 73. “ “ wing.
“ 74. *Oedalea ohioensis* sp. nov., leg.
“ 75. “ “ wing.
“ 76. “ “ hypopygium.
“ 77. *Hybos spinicosta* Wh. et Mel., wing.
“ 78. “ *mellipes* Wh. et Mel., wing.
“ 79. “ *triplex* Walk., hypopygium.
“ 80. “ “ antenna.
“ 81. “ “ antenna.
“ 82. *Lactistomyia insolita* gen. et sp. nov., leg.
“ 83. *Syndyas polita* Lw., wing.
“ 84. *Syneches thoracicus* Say, wing.
“ 85. “ *guadrangularis* Wh. et Mel., wing.
“ 86. “ *simplex* Walk., wing.

PLATE VIII.

Fig. 87. *Hormopeza brevicornis* Lw., hypopygium.
“ 88. “ *bullata* sp. nov., antenna.
“ 89. *Brachystoma occidentalis* sp. nov., whole insect.
“ 90. *Blepharoprocta serratula* Lw., wing.
“ 91. “ *binummus* Lw., hypopygium.
“ 92. “ “ side view of the hypopygium.
“ 93. *Gloma obscura* Lw., wing.
“ 94. *Hilara bella* sp. nov., leg of male.
“ 95. “ *wheeleri* Mel., front leg of male.
“ 96. “ *baculifer* sp. nov., fore leg of male.
“ 97. *Iteaphila peregrina* sp. nov., hypopygium.
“ 98. *Ragas mabelæ* sp. nov., hypopygium.
“ 99. *Holoclera bilineata* sp. nov., wing.
“ 100. *Lamprempis chichimeca* Wh. et Mel., wing.
“ 101. “ “ hypopygium.
“ 102. “ “ hind leg of male.
“ 103. “ *violacea* Lw., hypopygium from above.
“ 104. “ “ hypopygium from the side.
“ 105. *Empimorpha geneatis* sp. nov., hypopygium.
“ 106. “ *barbata* Lw., hypopygium.
“ 107. *Empis cæligena* sp. nov., male abdomen.
“ 108. “ *virgata* Coq., male abdomen.

PLATE IX.

Fig. 109. *Empis spectabilis* Lw., hypopygium.
“ 110. “ *Aldrichii* sp. nov., hypopygium.
“ 111. “ *obesa* Lw., hypopygium.
“ 112. “ *bicolor* Bell., wing of male.

Fig. 113. *Empis bicolor* Bell, middle tarsus of male.
“ 114. “ *montezuma* Wh. et Mel., hypopygium.
“ 115. “ *annulipes* Wh. et Mel., front tarsus.
“ 116. “ *atrifemur* Wh. et Mel., front tarsus.
“ 117. “ “ antenna.
“ 118. “ *xochitl* Wh. et Mel., hind metatarsus.
“ 119. “ *azteca* Wh. et Mel., wing.
“ 120. “ *rufescens* Lw., hypopygium.
“ 121. “ *rubida* Wh. et Mel., wing.
“ 122. “ *otiosa* Coq., hypopygium.
“ 123. “ *Johnsoni* sp. nov., hypopygium.
“ 124. “ *cacuminifer* sp. nov., hypopygium.
“ 125. “ *enodis* sp. nov., hypopygium.
“ 126. “ *nuda* Lw., hypopygium.
“ 127. “ *distans* Lw., wing.
“ 128. “ *dolorosa* Wh. et Mel., wing.
“ 129. “ *clausa* Coq., wing.
“ 130. “ *asema* sp. nov., hypopygium.
“ 131. “ *loripedis* Coq., hypopygium.
“ 132. “ *tridentata* Coq., hypopygium.
“ 133. “ *teres* sp. nov., hypopygium.
“ 134. “ *gladiator* sp. nov., hypopygium.
“ 135. “ *arthritica* sp. nov., hypopygium.
“ 136. “ *poplitea* Lw., hypopygium.
“ 137. “ *falcata* sp. nov., hypopygium.
“ 138. “ *valentis* Coq., hypopygium.
“ 139. “ *canaster* sp. nov., hypopygium.
“ 140. “ “ hind leg of male.
“ 141. “ *æripes* sp. nov., hind leg of male.
“ 142. “ *teres* sp. nov., hind leg of male from inside.
“ 143. “ *nodipes* sp. nov., hind leg of male from outside.
“ 144. “ *arthritica* sp. nov., hind leg of male from outside.
“ 145. “ *poplitea* Lw., hind leg of male from inside.

NOTE.—This paper was accepted by the faculty of Arts, Science and Literature of the University of Texas as a thesis for the degree of Master of Science.

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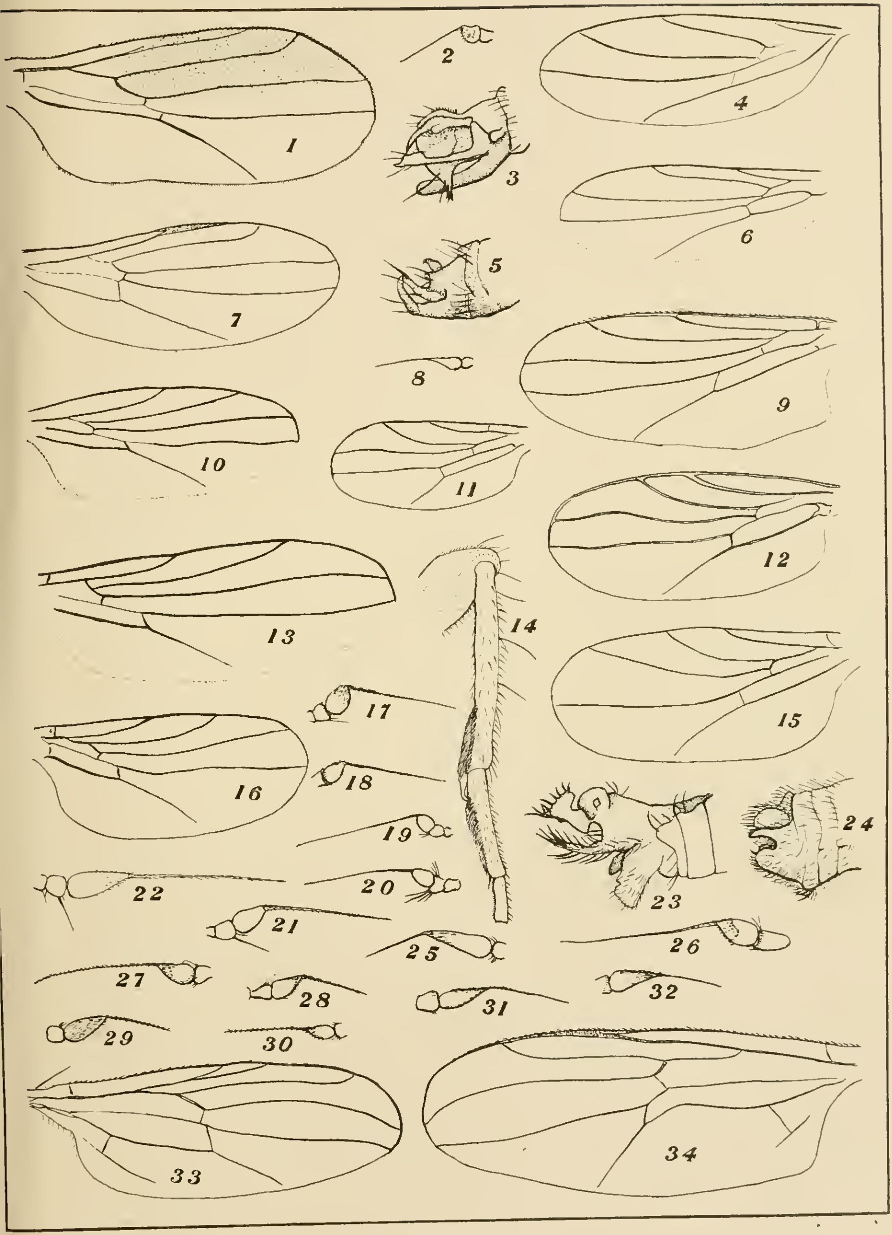
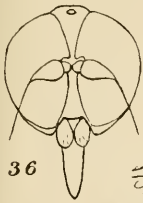
ERRATA.

Page 195, line 2, *for* Dipteron, *read* dipterous.
" 198, " 5, " anal canal, *read* anal cell.
" 200, " 15, " ærial, *read* aerial.
" 201, " 12, " *ærobatica*, read *aerobatica.*
" 205, *Stilpon pectiniger,* line 5, fourth word, *read* asymmetrical.
" 209, line 2, for *niger* read *nigra.*
" 213, *Drapetis gilvipes,* reference should read Cent. x, 61.
" 232, *Litanomyia elongata,* line 9, second word, *read* parallel.
" 233, line 6, fifth word, *read* acrostichals.
" 233, *Oreothalia pelops,* size should read 3 mm.
" 245, *Clinocera maculipes,* reference should include p. 118.
" 246, last line of table, for *triples* read *triplex.*
" 247, *Hybos mellipes,* reference should include p. 373.
" 247, " " line 6, third word, *read* cinerascent.
" 250, line 7, for *Scelobates,* read *Scelolabes.*
" 256, *Oedalea ohioensis,* line 6, for prealer, *read* prealar.
" 281, *Lamprempis diaphorina* and *benigna,* references should read, Biol. C-Am., Dipt., 1887. p. 215.
" 284, line 7, third word, *read* account.
" 284, second half of first division of table should go to No. 21.
" 288, division 66, second part, read *aerobatica.*
" 290, read *Empis atrifemur.*
" 292, *Empis pegasus,* for Suppl . *read* 1887.
" 335, third line of table, seventh word, *read* three-fourths.
" 339, line 6, *read* **pectiniger.**
" 342, line 13, third word, *read* infallibility.
" 350, table of *Empis,* second line, second word, for ot *read* or.
" " " " third line, *dele* , after mm.
" 351, line 7, last word, *read* evanescent.

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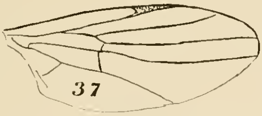
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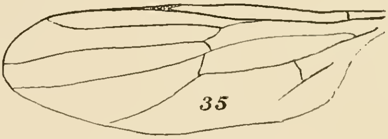
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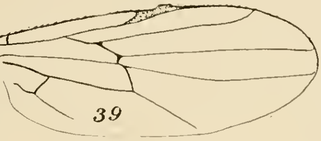
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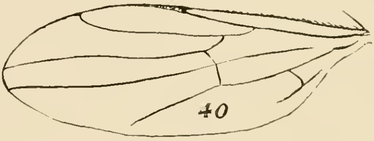
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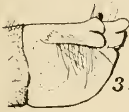
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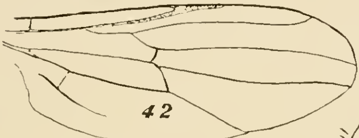
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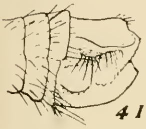
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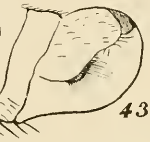
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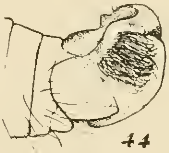
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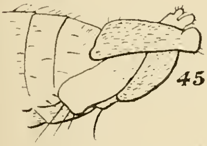
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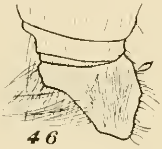
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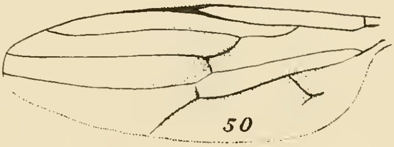
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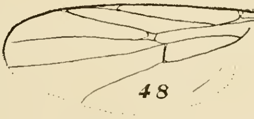
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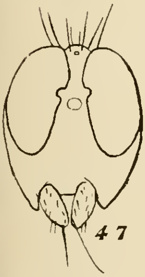
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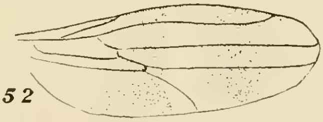
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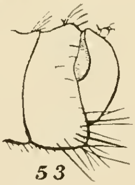
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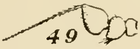
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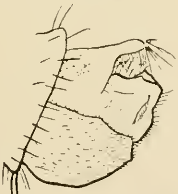
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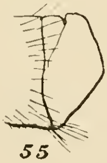
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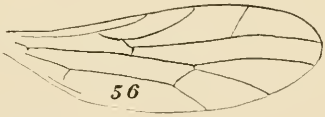
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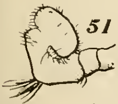
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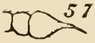
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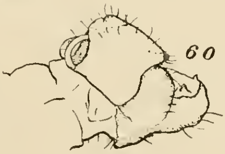
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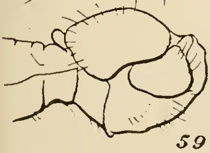
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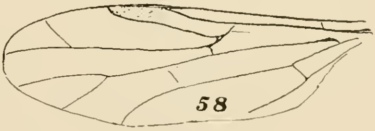
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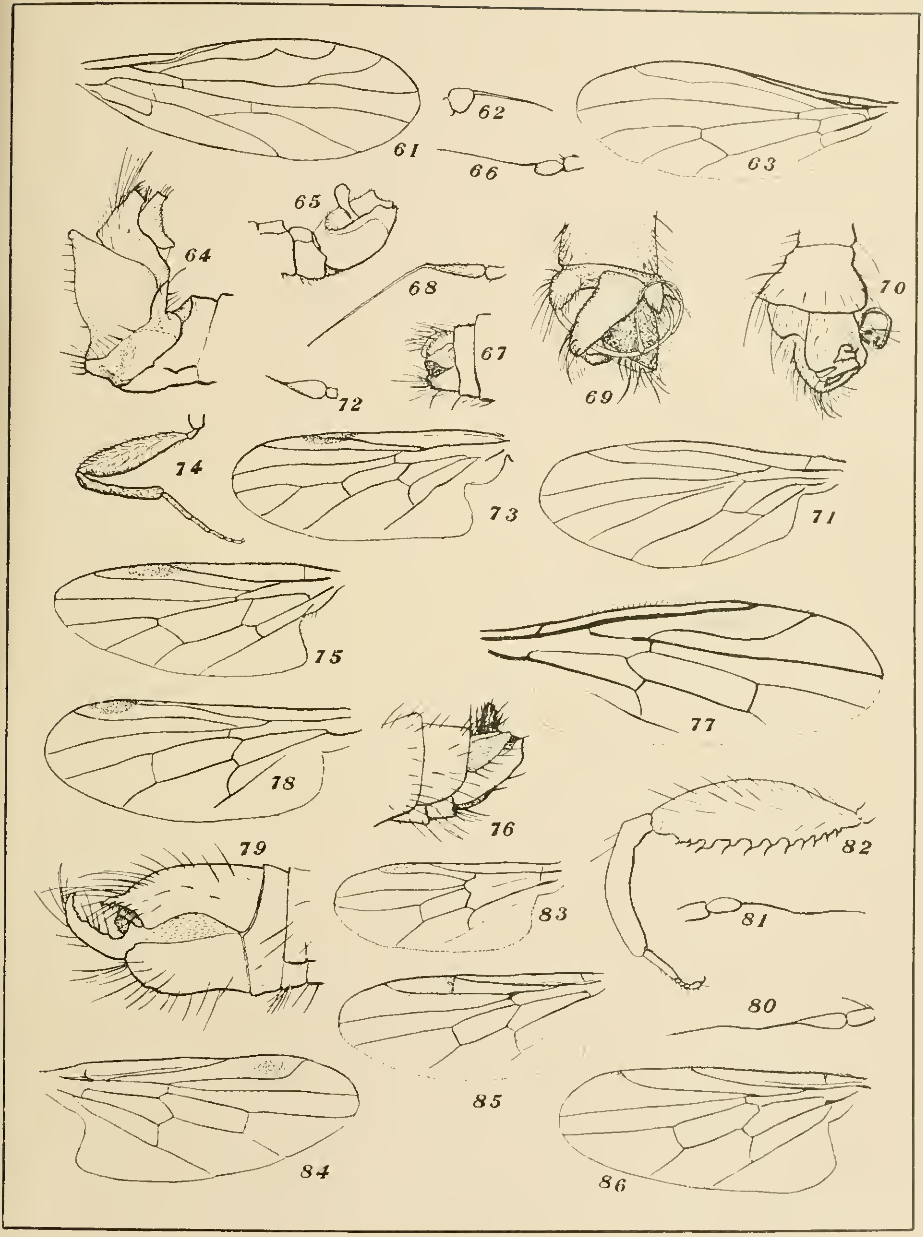

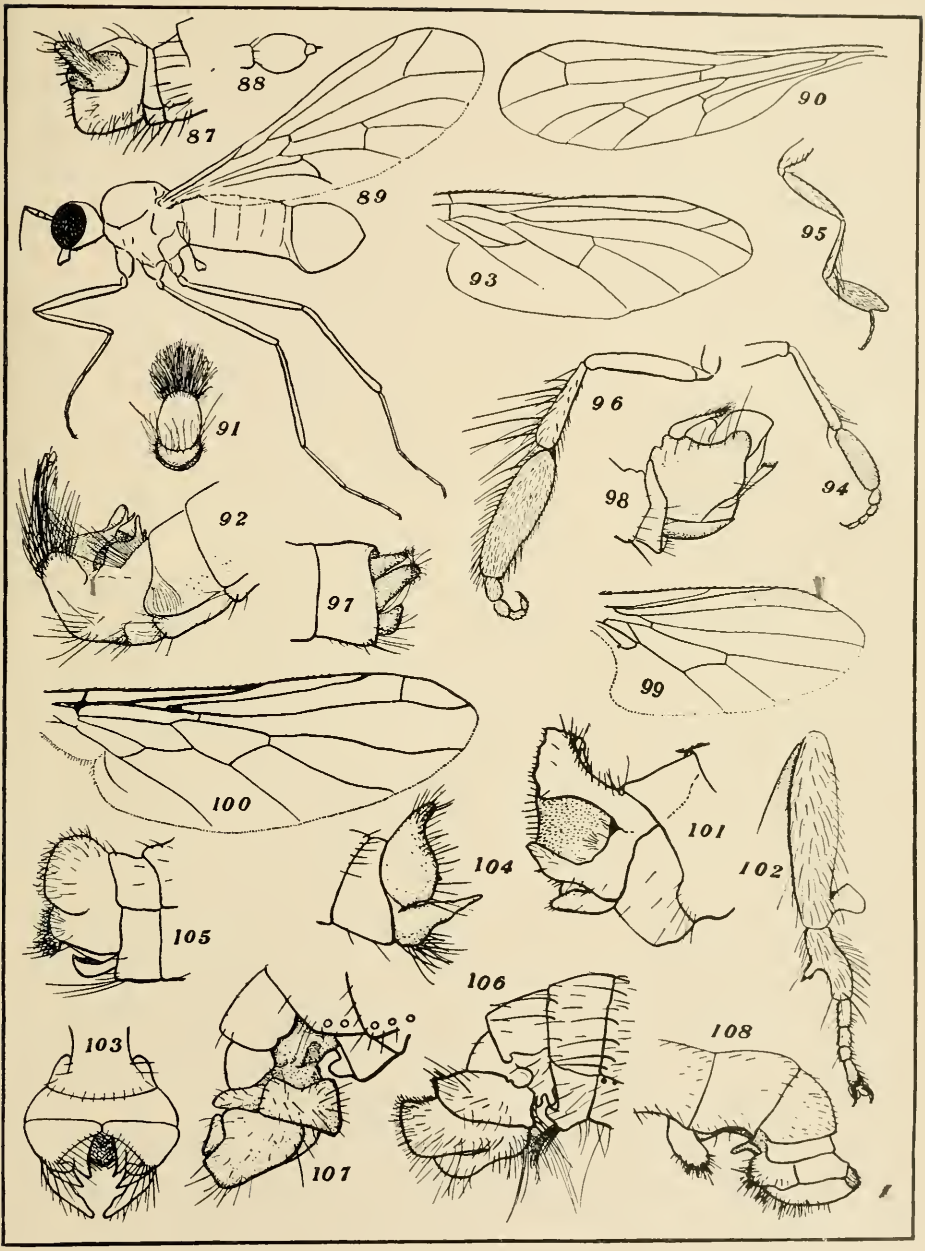

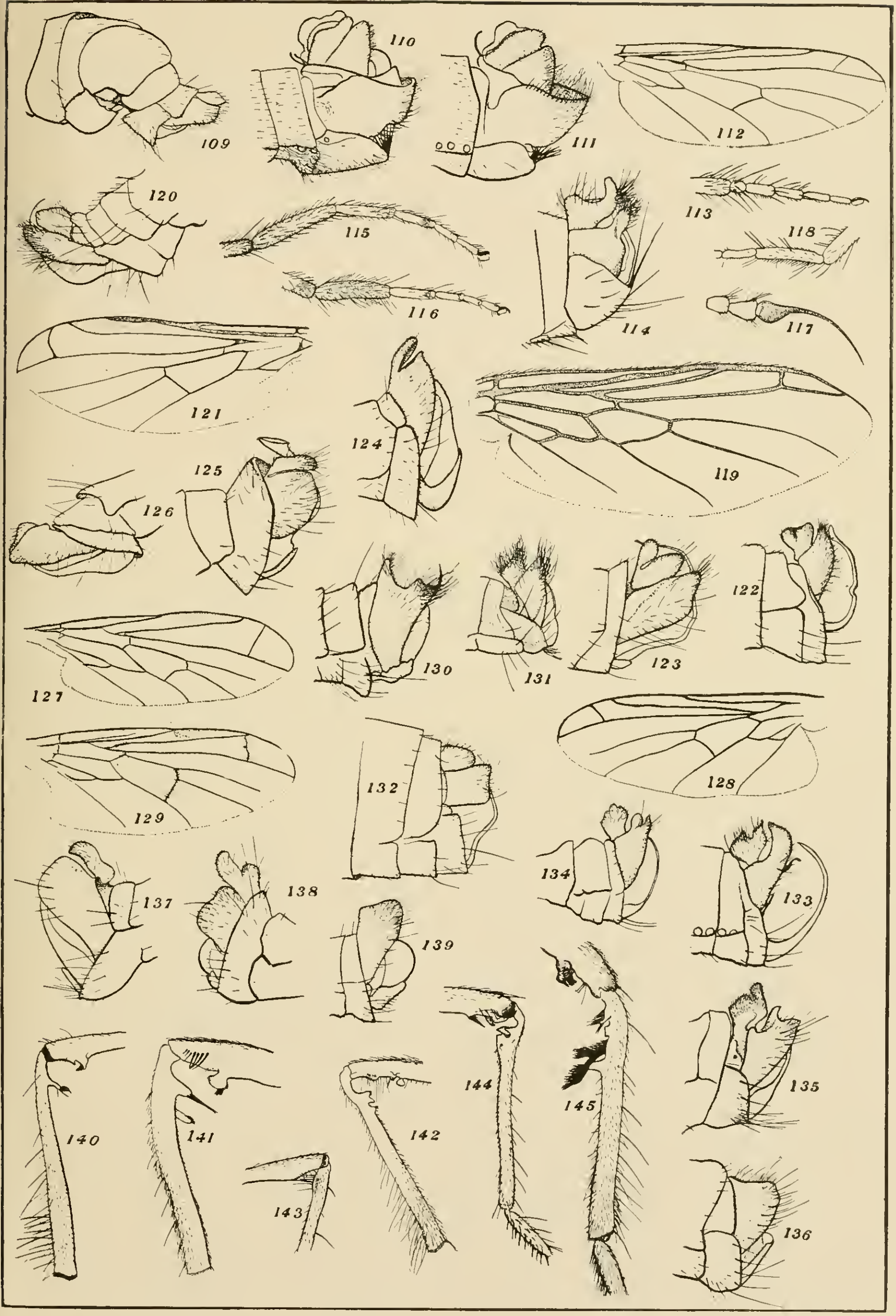

PSYCHE

VOL. XVII. APRIL, 1910. No. 2.

THE GENUS TACHYDROMIA.[1]

By A. L. Melander, Pullman, Wash.

Concerning the application of the generic names *Coryneta, Tachydromia, Platypalpus, Tachypeza* and *Tachista* of the family Empididae there is much confusion. In his early paper, the Nouvelle classification des mouches à deux ailes, bearing the date 1800, Meigen gives his forty-fourth genus the name *Coryneta,* describing it as follows. "Antennes à deux articulations: la première petite, hérissée de poils; la seconde conique, terminée par un poil barbu. Trompe perpendiculaire. Cuisses des jambes du milieu enflées. Le tibia armé a l'extrêmité d'un piquant. Les ailes croisées."

No species of the genus are mentioned by name, but Meigen states that he has recognized three species. In 1803 in his revision of this paper in Illiger's Magazine, Meigen gave the name *Tachydromia* to the fifty-second genus, mentioning however this time two species, *cursitans* Fabricius and *cimicoides* Fabricius. His diagnosis of *Tachydromia* is as follows. "Die Fühlerhörner vorgestrekkt, zweigliederig: das erste Glied becherförmig; das zweite kegel-förmig in eine Borste auslaufend. Der Rüssel senk-recht. Schenkel der Mittelfüsse dikk, stachlig. Die Flügel flach parallel."

It will be noted that the two descriptions read much alike, which is why Bezzi (in lit.) and Hendel[2] have concluded that both refer to the same genus, and that therefore the older name *Coryneta* should be given preference. The Nouvelle Classification has been an extremely rare paper. But three copies are known to exist, one at the Academy of Natural Sciences, Philadelphia, a second owned by Professor Heyden, and another belonging to the late Osten Sacken, and now in the possession of Dr. Hendel. Because of the obscureness of this early paper of Meigen it has been neglected by all writers. Its names are not given in the nomenclators, and even Meigen himself ignored its existence in his later works, as if ashamed of the curious meaningless names of his first publication. The diagnoses are brief, general and ambiguous, and, since no species are mentioned the identity of the genera would have remained mostly unknown, were it not that some of the early descriptions bear a similarity to the corresponding ones of the later paper. In nearly all cases however the generic names of 1800 are entirely different from those Meigen later used. The genera of Meigen's second contribution are well known, as for most of them typical species were cited at the beginning, and their names have been in constant usage for our commonest flies for more than a century. Even by this method of comparison and elimination many of the 1800 genera will never be understood.

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[1] Contribution from the Zoological Laboratory of the State College of Washington.
[2] Verhandl. k. k. zool.-bot. Gesellsch., Wien. 1908. pp. 43–69.

This early publication of Meigen remained entirely ignored until Dr. F. Hendel republished it entirely in the Verhandlungen of the Wiener Gesellschaft. If we were to accept his guesses as to the identity of these early genera we would overthrow such well-known names as *Ceratopogon*, *Odontomyia*, *Eristalis*, etc., as well as the long established type-genera of over a dozen families of diptera. But much of his evidence is insecure. The paper is worthless if not interpreted by Meigen's later works, the date of publication cannot be verified, there is even doubt if the paper was distributed on the date it bears, and nowhere are any species cited, so the genera are not true binomial conceptions. This last condition alone should not be followed too closely, for many of Meigen's genera of 1803 and 1804 were likewise published without mention of species.

Naturally to exhume these forgotten names has stirred up much discussion, and in the short interim since Hendel's republishing, there have been a score of opinions given out by various biologists. These opinions are sometimes conflicting but in the main zoologists strongly decry using the law of priority to bolster up such speciesless genera as Meigen's earliest. I shall give a list of the articles that have come to my notice bearing directly or indirectly on the principle of whether or not to adopt the newly disinterred genera. In this long parley the concrete example of Meigen's paper has been lost sight of by many of the contributors, and merely the principle has been under discussion, but nevertheless 'the entire argument outlined below was caused by the appearance of Hendel's reprint. A short digest of the articles will help to correlate the ideas advanced.

Professor Aldrich wrote in hopes of squelching Hendel's paper, to deter others from using the ancient names. Yet Kertész' last volume of the Catalogus Dipterorum hujusque descriptorum, volume v., 1909, adopts the family name Omphralidae for the Scenopinidae; his Catalogue of palaearctic diptera uses five of the early names in volume iii; while *Czerny* in a paper on Spanish Diptera [1] has discarded the family names Scatophagidae and Trypetidae, as he uses for them Meigen's earlier type genera *Scopeuma* and *Euribia*, forming thereby the family names Scopeumatidae and Euribiidae. However, Czerny does not use Meigen's early *Cypsela* to replace *Borborus*, as was advocated in Hendel's reprint.

Volume iii of the palaearctic catalogue has dispensed with the following well known genera on the plea of priority: *Ephippium*, *Oxycera*, *Odontomyia*, *Xylophagus*, *Haematopota*, *Subula* and *Leptis*. Surely the dipterist has a bewildering memory-lesson before him.

It is strongly to be urged in this period of nomenclatural unrest that writers be not too hasty in adopting the suggestions of Dr. Hendel. The trend of public opinion is that genera without species shall have no place in our system of classification. In view of the projected action of the Committee of the International Congress of Zoologists (see number 23 below), it would be decidedly rash to rush into publications the once-discarded names of 1800. It would be better to hold in abeyance any personal desires for Meigen's first names until the Committee can rectify the Code on this question. Such conservatism may prevent a premature overthrow of the names of our commonest genera, and might spare our overburdened literature from most confusing rearrangements of synonyms.

1. Nature, August 27, 1908, pp. 394–395.
   A composite letter by British zoologists deploring the fact that a strict adherence to rules sometimes brings unfortunate consequences.
2. N. Banks, Science, xxviii.
   Advises others who have rare papers to republish them.
3. S. W. Williston, Manual, 3rd. edit. p. 390, 1908.
   "Hendel would have deserved the thanks of a long suffering public had he withheld these copies instead of republishing."
4. M. Bezzi, Wiener entom. Zeit. xxvii. 252, Sept. 1908.
   Comments on the adoption of the names of 1800 that come in vol. iii. of Kertesz' Catalogue of palæarctic diptera, a course in which, naturally, he approves.

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[1] Verh. k. k. zool.-bot. Gesellsch., Wien, vol. 59, 1909.

5. J. M. Aldrich, Canad. Ent. xl. 370–373. Oct. 1908.
   Compares resurrecting the 1800 paper to finding some old grant to Indian lands. Every possible objection should be made before accepting them; a flawless case must be made out and the identification of the older genera is full of flaws. "Let justice be done" exclaims Hendel. To whom? Certainly not to Meigen by accepting this paper.
6. J. M. Aldrich, Canad. Ent. xl. 432, Nov. 1908.
   Quotes from Bezzi's paper (number 4, above) in the Wiener entomologische Zeitung. Hendel (number 9, below) says that the quotation is mis-applied.
7. D. W. Coquillett, Canad. Ent. xl. 457, Dec. 1908.
   Pleads for the adoption of the early names, citing rules from the code to cover his argument. Does not believe in obstructing the progress of nomenclature by discrediting Hendel's find.
8. P. H. Verrall, British Flies, v. 772, 1909.
   Meigen's 1800 genera are not legally established. Does not concur with Coquillett's "aggravated" pleading (no. 7).
9. F. Hendel, Wiener entom. Zeit. xxviii. 33–36, Feb. 1909.
   Discusses the comments in numbers 3, 4, 5, 6, 7, and 8. Stability of nomenclature can be had only by a strict adherence to the law of priority. Since Meigen described only genera, but gave the number of species that he knew, and in the preface designated his work as a prodromus of a later work designed to contain only the genera, he can not be said to have carelessly neglected the principles of binary nomenclature. Hendel states that 39 of the Brachycera genera can be immediately recognized from the descriptions alone. The future alone can tell whether the majority of dipterists will decide for continuity or for priority.
10. T. D. A. Cockerell, Science, xxix. 339, Feb. 26, 1909.
    Calls for a postal vote of opinions about genera without species. "A genus without species has no type, no content, and apparently has no place in our systems of classification."
11. J. M. Aldrich, Canad. Ent. xli. 103, March, 1909.
    In a review of Verrall's British Flies, Aldrich quotes the discovery of certain Chicago historians that the annulment of one of the marriages of King Henry VIII. was invalid, and that, consequently, King Edward VII. is not King of England. This discovery is on a par with the reasoning that Meigen's earliest genera should claim priority.
12. T. D. A. Cockerell, Science, xxix. 813, May 21, 1909.
    The result of the postal vote (number 10) shows the majority of voters not in favor of resurrecting the names of speciesless genera.
13. A. A. Girault, Science, xxix. 814, May 21, 1909.
    A genus described without a species is non-existent. Its name has no status until some definite type species has been designated.
14. J. A. Allen, Science, xxix. 935, June 11, 1909.
    "Prior to 1810 hundreds of genera now in current use were proposed solely on the basis of a diagnosis; although they were accepted and

have been in use from the date of their proposal, many of them were without designated types for half a century." "Apparently each case should be dealt with solely on its own merits."

15. F. N. Balch, Science, xxix. 998, June 25, 1909.
In a paper, "A Lawyer on the Nomenclature Question" Mr. Balch advocates an International Court with absolute power to settle everything nomenclatorial. The priority rule was not intended to be the superstition and incubus it has become. "Questions of nomenclature are of utterly insignificant importance so only that they be settled one way or the other, quickly, definitely, and permanently."

16. F. A. Bather, Ann. Mag. Nat. Hist. (8) iv. 37–42, July, 1909.
In an article "Some Common Crinoid Names and the Fixation of Nomenclature," Dr. Bather advocates the establishment of a court of nomenclature.

17. Wm. H. Dall, Science, xxx. 149, July 30, 1909.
Most questions of nomenclature can be answered by a serious study of the Code. For the few other cases he advocates giving the Committee power of decision.

18. A. N. Caudell, Science, xxx. 210, August 13, 1909.
"How can we get a type for a genus where there were no species originally included?"

19. F. A. Bather, Science, xxx. 341, Sept. 10, 1909.
Advocates a Court for the two cases, first, where the application of the Code is obscure, and second, where its application is clear, but the consequences at the same time would be exceedingly unfortunate.

20. J. A. Allen, Science, xxx. 365, Sept. 17, 1909.
"The only point is whether they are good genera or bad genera — in other words whether they are identifiable or unidentifiable from the basis furnished by the original founder."

21. J. Dwight, Jr. Science, xxx. 526, Oct. 15, 1909.
"Zoological nomenclature to-day seems to be little more than an intricate game of names, fascinating sport for its faithful devotees, but an intolerable nuisance for the uninitiated many." "Priority is rather a bog from which the nomenclatorial muck-rakers exhume the fossil remains of a past age." "It is not justice for the dead zoologist that we need so much as justice for the living, and even now the dead get no recognition if they violate the rules of a game unknown in their day."

22. A. S. Hitchcock, Science, xxx. 597, Oct. 29, 1909.
Believes it impractical for a committee to prepare a list of names that will be stable, because of the changing state of biological knowledge.

23. J. A. Allen, Science, xxx. 596, October 29, 1909.
Proposes the following recommendation for the International Committee. "A generic name proposed without mention of any described species is invalid unless it is accompanied by a diagnosis of such a character as to indicate that it is based on a previously known species, or group of species, that can be unequivocally identified as the basis of the diagnosis."

Therefore, instead of worrying over just which of the genera can be identified, it will be vastly better for the present to ignore entirely the Nouvelle Classification. It is absurd rigidly to apply modern rules of nomenclature to the works of the early writers, when as in this instance no good can be subserved, and a most confusing and "complete revolution in dipterological nomenclature" would result, a condition that Dr. Hendel seems eagerly to have hoped for. It is commendable to make use of the law of priority when stability and permanence will be guaranteed, but in the present case it is too risky to accept Dr. Hendel's views and make the wholesale changes he has suggested. Dr. Stiles has remarked that "neither the commission nor the congress has any power to force zoologists and others to accept the International Rules." I believe that my dipterist fellow workers should feel that one such occasion confronts them, if rules are to be construed, or misconstrued, to bolster up the once-discarded names.

With this digression we may disregard the name *Coryneta*, and take up the name *Tachydromia*. As just mentioned, Meigen assigned *Musca cursitans* Fabricius and *cimicoides* Fabricius to his genus. The first of these was an erroneous determination which was afterwards named *major* by Zetterstedt. *Cimicoides* Fabricius is a synonym of *arrogans* Linneus, but Meigen was confused in his identification here too, as a part of the specimens he thought were *cimicoides* he afterward described as *connexa*. Meigen had therefore three species before him, of which two were undescribed, and the third had previously been named *arrogans* by Linneus. Obviously, according to modern rulings, the type of *Tachydromia* must be selected from these three, and as *arrogans* was the only described species among Meigen's material, that species would probably be construed as the type. But neither *arrogans* nor *connexa* has the middle femora enlarged, nor are their middle tibiae spurred. Therefore they disagree with the only salient point of the diagnosis. For that reason, according to our present ideas, neither would have been selected as the type, and the honor of serving as type of *Tachydromia* should have been bestowed on Meigen's *cursitans* (*major* Zett.). The old genus has been dismembered, the separated genera have received their types, and our present ideals have not been fulfilled, because of the everlasting blundering between personal whims and priority laws.

Article 30 of the Code states: "If the original type of a genus was not indicated, the author who first subdivides the genus may apply the name of the original genus to such restricted genus or subgenus as may be judged advisable, and such assignment is not subject to subsequent change." Dr. Stiles [1] has given a personal ruling further that "If an author, in publishing a genus with more than one valid species, fails to designate or to indicate its type, any subsequent author may select the type, and such designation is not subject to change." Although this is a personal opinion its soundness is apparent. With these citations, we may take up the subsequent history of Meigen's *Tachydromia.*

Meigen's early conception of the genus was the same as our present idea of the subfamily Tachydromiinae, or even the combined subfamilies Tachydromiinae and Hemerodromiinae, and in this he was followed by the earlier writers, such as Fallén. In 1822 in the third volume of the Systematische Beschreibungen Meigen separated from *Tachydromia* the genera *Hemerodromia* and *Drapetis.* The remaining Tachydromias he grouped into two divisions, A and B, with his *cimicoides* in A. and his *cursitans* in B, but still retaining all in the genus *Tachydromia.* Macquart in 1827 bestowed the name *Platypalpus* on division B which was the larger group, keeping the name *Tachydromia* for the first group, but Meigen not knowing this renamed the first division *Tachypeza,* to retain the original name for the larger division. This change was published in 1830, and later he refused to adopt Macquart's name because he thought his own ideas were better.

In a paper in the Zeitschrift fuer Entomologie, published in Breslau in 1863 Loew discussed the question at length and following Meigen discarded the name *Platypalpus* because it is a poorly formed compound of Greek and Latin. For the larger group, or those species related to *cursitans,* he retained the name *Tachydromia.* The remainder of the genus he subdivided into *Tachypeza, Tachista, Dysaletria,* and *Phoneutisca,* bestowing the name *Tachista* on those species grouped about *cimicoides.* The majority of the prominent European dipterists have adopted this view principally out of deference to Meigen and Loew.

The date of publication of the name *Platypalpus* is certain, and its designation is unquestionable. We have therefore no recourse but to accept it as a valid name. To this genus belongs the *cursitans* of Meigen's original *Tachydromia.* Eliminating this species, the *cimi-*

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[1] Bull. 24, Hygienic Laboratory, p. 27 (1905) Rule 10.

coides of Meigen should be the type of the restricted *Tachydromia*. Coquillett however has designated *connexa* as the type, forgetting that part of Meigen's *cimicoides* belonged to Linnaeus' early species *arrogans*. This however will not invalidate the limitations of the restricted Tachydromia, as *arrogans* and *connexa* are very closely related species, certainly congeneric.

The status of the old genus *Tachydromia* is therefore as follows.

Front and middle femora thickened: *Division B.* Meigen.
  Platypalpus Macquart, Westwood, Blanchard, Walker, Schiner, Philippi, Coquillett, Melander.
  Tachydromia Meigen, Burmeister, Zetterstedt, Berendt, Scholtz, Bonsdorff, Loew, Bigot, Mik, Strobl, Becker, Kertész, Bezzi, Frey.
  Phoroxypha Rondani, Coquillett.
Front femora thickened: *Division A.* Meigen.
  Anal cell imperfect........................... **Tachypeza** Meigen, Loew.
  Anal cell completely wanting............ **Tachydromia** Meigen, Coquillett.
  Tachista Loew, Becker.

The type species of these genera are as follows:

Platypalpus. Type species *cursitans* Fabricius, indicated by Westwood in 1840. It is quite likely that Westwood had Meigen's original *cursitans* in view, in which case the type should be *major* Zetterstedt.

Tachypeza. Type species *nubila* Meigen. Rondani in 1856 designated *nervosa* Meigen as the type, and this is a synonym of *nubila*.

Tachydromia. Type species *connexa* Meigen. As explained before Meigen indicated two species, *cursitans* and *cimicoides*. As the type species should be one of those originally listed by the describer elimination leaves *cimicoides* as the type, since Meigen's *cursitans* belongs to the subsequently erected genus *Platypalpus*. Meigen's *cimicoides* included two species, *arrogans* Linnaeus and the later described *connexa* Meigen, the second of which Mr. Coquillett has designated as the type.

During the last half century a number of other genera have been proposed for new material rather than as constrictions of the older genus. The relationships of these genera can be seen from the following synopsis of the present subfamily Tachydromiinae. All the known genera and sub-genera are included.

Genera and Subgenera of the Tachydromiinæ.

- Thorax slender, humeri large, strongly constricted: palpi narrow: legs not bristly: front femora thickest.
  - First basal cell much shorter than the second: black species.
    - Anal cell present: arista terminal.................**Tachypeza** Meigen.
    - Anal cell completely wanting.
      - Arista terminal or sub-terminal: marginal cell long. **Tachydromia** Meigen.
      - Arista sub-dorsal: second vein abruptly recurved. **Phoneutisca** Loew.
  - First basal cell longer than second; outer angle only of anal cell present: yellow species...................................**Dysaletria** Loew
- Thorax broad: humeri rarely large: legs hairy and usually with bristles: palpi usually broad.
  - First basal cell shorter than second: eyes close together, especially below the antennae.
    - Arista terminal.
      - Anal cell complete or incompletely formed.
        - Front and middle femora thickened: middle femora with a double row of spines beneath: middle tibiae ending in a spur: eyes separated: palpi broad...............**Platypalpus** Macquart.
          - Last joint of tarsi normal.................**Platypalpus** s. str.
          - Last joint of anterior tarsi greatly lengthened. **Cleptodromia** Corti.
        - Femora not thickened: middle legs without spurs and with minute or no spines: eyes contiguous: palpi small: basal cells subequal. **Symballophthalmus** Becker.
      - Anal cell wholly wanting: posterior femora more or less thickened. **Drapetis** Meigen.
        - Body robust, abdomen shorter than thorax: Wings broad, not ciliate.
          - Third antennal joint short-oval................**Drapetis** s. str.
          - Third antennal joint lanceolate..........**Elaphropeza** Macquart.
        - Body more slender: abdomen longer than thorax: wings cuneiform: costa long ciliate.......................**Ctenodrapetis** Bezzi.
    - Arista dorsal: front femora thickened..................**Stilpon** Loew.
  - First basal cell equal to or longer than second: more or less opaque pollinose species: eyes usually widely separated on the face.
    - Arista dorsal.
      - Wings less than one-third the abdomen.......**Thinodromia** Melander.
      - Wings surpassing the abdomen, anal cell faint...**Halsanalotes** Becker.
    - Arista terminal.
      - Antennae three-jointed: legs thick and bristly: eyes very small. **Coloboneura** Melander.
      - Antennae two-jointed: legs but little thickened and with few bristles, face narrow.............................**Chersodromia** Walker.

Tachydromia sens. str.

Minute, slender flies of shining jet-black color and almost devoid of hairs and bristles. Head globular, eyes large, with large facets, in both sexes broadly contiguous on the face; front narrow, its sides nearly parallel, and but slightly diverging toward the vertex; three ocelli present; occiput broad, produced sub-conically at the neck and provided with sparse short bristles. Antennae short, two-jointed, the outer joint short rounded oval, with the long slender nearly bare arista terminal or nearly so. Proboscis shorter than the head, rigid, vertical: palpi applied against the proboscis and tipped with several short bristles.

Thorax longer than broad, not greatly convex, not truncate in front but considerably narrowed from the wings forward; humeri remarkably enlarged and separated from the narrow central part of the mesonotum by more or less deep furrows; a prealar lateral bristle on mesonotum; scutellum normally with two pairs of short marginal bristles, the basal pair microscopic, usually no other thoracic bristles or hairs present. Hypopygium small, more or less globular, or triangular in outline, terminal. Legs slender, the front femora somewhat thickened, devoid of bristles, but with microscopic hairs, those of the under side of the front tibiae serrately arranged, no spurs or conspicuous spines present. Sometimes the male legs have small spines on the middle femora or tibiae beneath. Wings narrow, costa ending at the fourth vein and sometimes thickened beyond the insertion of the first vein, hind margin of the wing short ciliate; no trace of an anal cell present.

Our known American species of *Tachydromia* divide nicely into two groups. The first of these includes slender species with elongate wings and legs. This group is typical of *Tachydromia* and is largely represented in the palaearctic fauna. The second group is more aberrant. Our species will probably be separated ultimately from *Tachydromia* as several genera, but for the present it would be quite unwise to do so. It is unfortunate that the small size and difficulty of capture of these species are responsible for their scarcity in collections. Undoubtedly we know but a fraction of the forms the world over, and until our collections are more complete we cannot hope to understand the relationships of these interesting little flies.

The typical Tachydromias are shining black, nearly bristleless flies and have a dark band, or two dark bands, across the wings. The arista is terminal and the palpi are long and narrow. The front of the head is very narrow, its sides almost parallel. The emargination of the eyes at the level of the antennae is less deep, and all the facets are of nearly uniform size. The pectus is pruinose, the coating extending backwards to form a conspicuous glistening white spot over the front coxae and under the humeri. The hypopygium is also somewhat smaller than with the other members of the genus. The first basal cell is generally very long. It is to this group that *arrogans* and *connexa* belong.

The species of the second group differ in having a shorter and broader thorax, with the humeri not so pronounced. They lack the pruinosity above the front coxae. The arista is subterminal and the palpi are usually broader. The front of the head is broader, with its sides diverging above. The eyes are more deeply emarginate, and the lower facets are conspicuously larger than the upper. The wings are shorter in proportion to the body, and are not fasciate; the two basal cells are more nearly equal in size, and the marginal cell is usually shorter.

Although the genus separates into two definite groups whose characters may seem to be of generic value, I hesitate about placing together the species of group two as a restricted genus, for they appear to represent several phyletic lines. The basic points of difference between these species are the following:

1. *simplicior.* Wings as in *Drapetis*: palpi narrow: thorax glistening, devoid of bristles: humeri prominent.
2. *maculipennis, calva.* Palpi narrow: thorax narrow, glistening black, devoid of bristles, humeri prominent.
3. *insularis.* Thorax shorter, somewhat glaucous, humeri smaller: palpi long and narrow.
4. *agens, universalis.* Thorax somewhat glaucous, shorter, with bristles; humeri smaller: palpi broader.

The table following is given for the determination of the American species. Several other species have been referred to this genus by one writer or another. The accompanying notes will explain their status.

Tachydromia lata Coquillett [1] is omitted from the tables as it probably is a *Drapetis*. Since the description states that the mesonotum is broader than long, the legs are provided with bristles and the first basal cell is much shorter than the second it is evident that the species is not a *Tachydromia*. Mr. Coquillett separates *Tachista* (or *Tachydromia* as here given) from *Drapetis* in his analytic key only by the comparative thickness of the front femora, an elusive characteristic.

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[1] Proc. Ent. Soc. Wash. V. p. 266 (1903).

Tachydromia nubifera Coquillett [1] has been referred by its author [2] to the genus *Coloboneura*, a genus which has very bristly legs. I am unable to corroborate this from his description alone. The shortened second basal cell of *nubifera* excludes the species from *Tachydromia*, but the subopaque pruinosity and colored wings are at variance with the typical species of *Coloboneura*.

Mr. Coquillett has assigned *Drapetis flavida* Williston to *Tachista* [3] While the male is unusually slender for a typical *Drapetis* this species lacks the constricted swollen humeri of the *Tachydromia* group and moreover the legs are pubescent and provided with bristles and both the marginal and the first basal cells are short as in *Drapetis*. The species can with all propriety be located in Bezzi's recent subgenus *Ctenodropetis*. It may be here noted that the description of *Tachydromia bacis* Walker described from Jamaica tallies with this species. As Mr. Walker's description is unusually complete, mentioning even the bristles of the legs, it is reasonably certain that both species are the same. I have specimens from Yucatan, Orizaba, Vera Cruz, Cuba and Hayti. Mr. Coquillett reports it from Porto Rico, and Dr. Williston's specimens came from St. Vincent. It is evidently a common species within its geographic range. There is an ancient and brief description of *Tachydromia abdominalis* Wiedemann [4] from China that also applies to our specimens. *Ctenodrapetis ciliatocosta* Bezzi [5] from Australia is also quite similar, but is somewhat smaller. Possibly there is but one widely distributed form. I take it that *abdominalis* is a *Ctenodrapetis* rather than a *Platypalpus* as the abdomen is described as lusterless. In almost all the species of *Platypalpus* the abdomen is shining.

Mr. Coquillett [6] thinks that *Phoneutisca bimaculata* Loew is a synonym of *maculipennis* Walker which was described from Hudson

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[1] Dipt. Commander Isl. p. 343 (1898).

[2] Proc. Ent. Soc. Wash V. p. 265 (1903).

[3] Proc. U. S. Nat. Mus. XXII. p. 251 (1900).
Proc. Ent. Soc. Wash. V. p. 265, note. (1903.)

[4] Auss. zweifl. Ins. II. 12 (1829).

[5] Ann. Mus. Nat. Hung. II. p. 355 (1904).

[6] Proc. Ent. Soc. Wash. V. p. 266 (1903).

Bay Territory. I do not think this is so. *Bimaculata* is a much smaller species with white palpi, and is rare. The only specimen I have seen is the type from Alaska. I take it however that *maculipennis* is the same as our common *pusilla* Loew. I have examined over fifty specimens of this species from Massachusetts, Wisconsin, Illinois, Missouri, and South Dakota. Since it is so widely distributed in the States it probably occurs in Canada also. The rest of Mr. Walker's Tachydromias I can not decipher. They may belong to *Tachypeza* or to the present genus. Osten Sacken listed *vicarius* as a *Platypalpus*. The two-line description reads that the legs are slender which raises more doubt as to what the species really is.

Table of the North American Species of Tachydromia.

1. A white glistening pruinose spot between the front coxae and the humeri, rarely absent: wings with two dark bands: the distance between the two cross veins more than twice the length of the hind cross vein: arista terminal..2.
No glistening spot on the pleurae: wings with a single brownish subapical cloud or hyaline; cross veins separated scarcely more than the length of the hind cross vein: arista subterminal......................6.
2. Palpi and halteres black: marginal cell obliquely truncate **enecator** Melander.
Palpi and halteres paler: marginal cell rounded at the end..........3.
3. Dark cross bands united along the costa........**varipennis** Coquillett.
Dark cross bands separated.......................................4.
4. Wings blunt, fringed with comparatively long hairs: propleurae not pruinose....................................**ciliata** sp. nov.
Wings slender, the marginal hairs short: propleurae pruinose........5.
5. Legs nearly uniformly dusky..................**schwarzii** Coquillett.
Base of legs pale yellow, outer portions in part black. **schwarzii** var. **diversipes**. var. nov.
6. Palpi black: wings with a broad subapical cloud. **maculipennis** Walker.
Palpi yellowish: wings unclouded..................................7.
7. Thorax shining, humeri prominent: palpi narrow..................8.
Thorax and abdomen sub-glaucous, humeri smaller................9.
8. Third and fourth veins divergent......**simplicior** Wheeler & Melander.
Third and fourth veins subparallel....................**calva** sp. nov.
9. Palpi long and narrow: scutellum with four bristles: antennae reddish. **insularis** sp. nov.
Palpi broader: scutellum with two bristles.......................10.
10. Acrostichal and dorsocentral bristles present: legs slender piceous, antennae black..................................**agens** sp. nov.
Middle of dorsum without bristles: base of legs and of antennae yellow, last tarsal joint black..........................**universalis** sp. nov.

Tachydromia enecator Melander.

Trans. Am. Ent. Soc., xxviii, 226, ♀ (1902).

Length 3¼ mm. Totally jet black, shining, except that the knees narrowly and the metatarsi are piceous, the palpi, antennae and halteres are dull black, and the hinder occiput, pectus, metanotum, a narrow vertical stripe on the metapleurae, front coxae, and underside of the front femora are provided with a light pruinose coating. Outer antennal joint elliptical, arista terminal. Humeral swellings of mesonotum large and well marked: no bristles on disc of mesonotum, scutellum with four minute bristles. The ♂ abdomen depressed, less shining apically, the hypopygium small, terminal, somewhat triangular in outline, it and the last ventral segment provided with short blackish hairs. Wings with two dark cross bands, the second vein appendiculate in the known specimens.

But five specimens are known of this species. The two cotypes, both females, are from Quebec and Wyoming. They are now located in the Wheeler collection at the American Museum of Natural History, New York City. I have a male and two females, collected by my former student, E. L. Jenne, at Douglas, Alaska, August 2, 1901. This is our largest species.

Tachydromia schwarzii Coquillett.

Coquillett, Proc. U. S. N. Mus. xviii. 440 (1895).
Melander, Trans. Am. Ent. Soc. xxviii. 225, fig. 52 (1902).

Length 2.5 mm. Shining black, the legs yellowish. Occiput and propleurae pruinose. Antennae fuscous to black, the outer joint rounded, the terminal arista about four times the length of the antenna. Facets of the eyes nearly uniform, front narrow. Palpi glistening white to dirty white, elongate and slender. Mesonotal disc shining, bristleless, scutellum with four short bristles. Hypopygium moderate, rounded, its curved slender appendages sometimes exserted. Legs including the coxae dusky yellow, the hind legs darkest, the tibiae and tarsi more or less infuscated. Halteres pale yellow. Wings slender, rather pointed, crossed by two broad brownish fasciae, leaving the base, middle and tip hyaline; the marginal cilia normally short.

This is a common insect in the West. During the entire summer it hurries about in quick little zig-zag runs in search of its small victims, curiously probing among grass, stones, sidewalks, houses, in fact it can be found almost everywhere in this region. I have seen hundreds of living specimens, and have examined nearly a hundred mounted individuals from Moscow, Idaho, and Pullman and Wenatchee, Washington. The types came from California and Utah. They are numbered 3246 and 3247 in the National Museum collection.

In structure, venation, and general appearance this species resembles *annulimana* Meigen, of the European fauna; which however has striped femora, incrassate front tibiae, an erect hypopygium, some dorsocentral bristles in front of the scutellum, and moreover lacks the white pruinose spots beneath the humeri.

Tachydromia schwarzii var. diversipes var. nov.

Melander, Trans. Am. Ent. Soc. xxviii. 225 (1902). *T. schwarzii*, var.

Male. Similar to *schwarzii* in all structural characters, but differing in coloration. The base of the legs is lighter, the outer portions blacker than in typical form, thus making a greater contrast in color. The coxae, trochanters, base of all the femora, the basal two-thirds of the front tibiae, and the tarsi except the tip almost white in color. The outer third of the front tibiae is abruptly black; the four posterior tibiae, except the knees, and the hind femora except the base, black. The palpi are blackish. The cross-bands of the wings are lead-gray, and are darker than is usually the case with *schwarzii*, where they generally have a brownish tinge.

Two males which I captured at Dry Creek, near Austin, Texas, April 20, 1901. The specimens were running over rather large stones in this moist ravine at the base of Mount Barker.

Tachydromia ciliata sp. nov.

Wheeler and Melander, Biologia Cent. Am., Dipt. Suppl. 375 (1901) *schwarzii*.

Female. Length about 2 mm. Quite similar to *schwarzii* in general appearance, but differing in the structure of the wings. Shining black, legs clear yellow except the infuscated outer two-thirds of the hind femora and tibiae. Antennae yellow; as they are defective nothing can be stated about the arista. Front narrow, facets of the eyes uniform. Palpi whitish. Occiput and thorax shining black, the propleurae not pruinose: humeri large and deeply constricted: the inner pair of scutellar bristles moderately long. First ventral segment white or whitish. Halteres yellow. Wings comparatively short and broad, blunt at the end, and margined with a conspicuous fringe of hairs which are prominent even on the costa; two brown cross-bands are present as in *schwarzii*, but because of the shortened wings the outer fascia appears less extensive; the third and fourth veins more distant from each other and continuing to the wing-tip without converging (in *schwarzii* they lie closer together and converge towards the tip).

I have two specimens before me from Guerrero, Mexico, one taken at Chilpancingo, at 4600 feet altitude, the other labeled Sierra de las Aguas Escondidas, 9500 feet. There are some minor differences between the two specimens. The former measures 1.75 mm. and has the outer cross-band nearly as in typical *schwarzii*. The latter individual measures fully two mm. The base of its wings is less hyaline, but otherwise the wings are as described. The first ventral segment of the abdomen is only dusky, not white. The third specimen mentioned in the Biologia is in the Wheeler collection at the American Museum. This species corresponds to *excisa* Loew of the European fauna.

Tachydromia varipennis Coquillett.

Coquillett, Proc. Ent. Soc. Wash., v. 266 (1903).
Slosson, Ent. News, xiv. 266 (1903) habits.

Length 2 mm. Shining black, pro- and metapleurae pruinose, coxae, base of femora and proximal part of tarsi fuscous. Outer antennal joint short ovate, the terminal arista three times the length of the antenna. Palpi whitish. Humeri constricted from the central part of the thorax by an evident groove; no bristles on disc of notum, scutellar bristles minute. Hypopygium minute, terminal, without conspicuous hairs. Halteres white. Wings infumated, the base, tip and a transverse streak in the middle, but not including the marginal and submarginal cells hyaline.

I have four specimens from the type lot, received from Mrs. Annie Trumbull Slosson. They were taken in the White Mountains at Franconia, New Hampshire. The type is in the National Museum, number 6774. It is this species that is mentioned in Aldrich's Catalogue, page 314 under *schwarzii*, as occurring in New Hampshire.

In her article, Hunting Empids, in the October issue of the Entomological News for 1903, Mrs. Slosson gives the following notes on the habits of this fly. "About the first of July I always find here a pretty little creature running rapidly over wet stones at the margin of streams. It is a tiny fly with gray wings variegated with black, and its habits are odd and interesting. Though its wings are fully formed and quite capable of flight, it very rarely uses them. When pursued by the collector it runs swiftly like an ant on and around the stone, and will continue this elusive performance for many minutes, though by spreading its pretty wings it could at once escape capture. Only in desperate extremity, as a very last resort, will it sometimes take flight and rest upon another near-by stone. For a long time I found them very difficult to catch. But at last I discovered that by seizing the stone on which one was running and dropping it quickly into my net I had the little fellow safe and sound."

Tachydromia maculipennis Walker.

Walker, List Dipt. Ins. in Coll. Brit. Mus., iii. 507 (1849).
Loew, Cent. v., 74 (1863) *Tachypeza pusilla* ♀.
Melander, Trans. Am. Ent. Soc. xxviii. 228; and 229, f. 51 (*pusilla*); and 204, f. 1. (*Phoneutisca bimaculata,* Dakota specimens) (1902).
Coquillett, Proc. Ent. Soc. Wash. v. 266 (1903) *Phon. bimaculata.*
Aldrich, Catalog N. Am. Dipt., 310 (1905), *Phon. bimaculata.*

Length 2 mm. Shining black, antennae, palpi, proboscis and halteres also black, no pruinose spots on thorax. Outer joint of antennae short-conical, the arista two times the length of the antenna, almost terminal. Humeral swellings prominent, well constricted from the central portion of the thorax; no notal bristles; scutellum with four marginal bristles, the outer pair short. Hypopygium swollen, black hairy, the last ventral segment with a conspicuous fringe of black bristles. Legs largely blackish, the coxae, trochanters, and base of the femora paler; front tibiae and tarsi more or less yellowish; the last two tarsal joints black. Halteres whitish. Wings with a brownish cloud filling the submarginal and first posterior cells; the two cross veins approximate.

The type of this species, now in the Museum of Comparative Zoology, Cambridge, Massachusetts, was collected by LeBaron in Illinois. I have specimens before me from Chicago, Illinois, Milwaukee, Wisconsin, Atherton, Missouri (C. F. Adams) and Brookings, South Dakota (J. M. Aldrich). Dr. Hough has taken the species at New Bedford, Massachusetts. Mr. C. W. Johnson records *pusilla* from New Jersey in Smith's Catalog. The synonymy of this species is discussed in the introduction *anteà,* page 52.

Tachydromia simplicior Wheeler and Melander.

Wh. and Mel., Biologia Cent. Am., Dipt. Suppl. 375 (1901) *Phoneutisca.*
Melander, Trans. Am. Ent. Soc. xxviii. 205, f. 6. (1902) *Phoneutisca.*

Length 1.5 mm. Body shining black, legs entirely yellow. Antennae short, the outer joint minute, smaller than the basal joint, the arista sub-dorsal. Palpi pure white, moderately broad. No bristles on mesonotal disc; scutellum with a pair of well separated marginal bristles; humeri well constricted and prominent; the sides of the thorax are very lightly pruinose, but there is no pruinose spot above the front coxae. Abdomen depressed, brownish hairy, the hypopygium small, terminal. Legs including the coxae yellow. the hind femora a little infuscated apically. Halteres yellow. Wings nearly hyaline, a very faint darker streak passes longitudinally through the middle of the wing; marginal cell short, submarginal cell full, third and fourth veins divergent.

A single male collected by Mr. H. H. Smith at Vera Cruz, January, 1888, from the Wheeler collection of the American Museum of Natural History. This specimen very likely belongs with the type female, which was collected in Chilpancingo in Guerrero. The two locations are on opposite sides of Mexico. The specimen is glued on a card and is not in the best of condition for description. The type has the third vein nearly straight. Here it is rounded in an even curve diverging from the fourth. This specimen has less of the purplish and bronze tinge to the body.

The definition characters of *Phoneutisca* led us to place this species in that genus. An examination of the true *Phoneutisca bimaculata* in the Museum of Comparative Zoology showed it to be quite a different insect than was supposed. The abruptness of the marginal cell in *Phoneutisca* is very striking.

Tachydromia calva sp. nov.

Shining black above, paler beneath, outer half of femora blackish. Antennae black, palpi slender, whitish, dorsum without evident bristles; wings lightly infumated, third and fourth veins sub-parallel.

Female. Front jet black, triangular; ocelli prominent, occiput with sparse short black hairs; eyes deeply and broadly emarginate at antennae, face obliterated by the contiguity of the eyes, facets nearly uniform. Antennae short black, last joint not as long as broad and smaller than basal joint, the arista subterminal, finely and closely pubescent, nearly five times the length of the antenna. Palpi narrowly elongate, whitish yellow: proboscis very small, black.

Thorax shining black, the humeri large, so that the thorax is nearly quadrate, a few microscopic dorsal bristles only, a single bristle in front of the wings, scutellum with a pair of short bristles, the scutellum very lightly dusted. Abdomen pitchy black, sub-shining. Coxae, trochanters, basal half of femora and the tibiae yellow, outer half of femora blackened, tarsi a little dusky; front femora somewhat thickened. Halteres yellow. Wings narrow, nearly hyaline, lightly infumated especially noticeable at tip of first vein, marginal cell long, third and fourth veins parallel.

Described from a single female, presumably collected by Mr. G. R. Pilate as it bears the label, Tifton, Georgia, Sept. 25, 1896. The specimen was presented to me by Dr. G. deN. Hough. It measures one millimeter in length.

Tachydromia insularis sp. nov.

Male. Length 1.1 mm. Head and thorax pruinose; legs testaceous; wings clear hyaline; antennae reddish at base; palpi elongate, reddish;

scutellum with four black bristles; acrostichal and dorsocentral bristles microscopic; hypopygium large, flexed to the right.

Front narrowly V-shaped, cinereous; ocelli large, ocellar bristles present, black; first antennal joint testaceous, the outer joint fuscous, pubescent, arista subterminal, pubescent, four times the length of the antenna. Eyes completely contiguous on the face, facets uniform. Palpi twice as long as broad, sericeous, testaceous. Proboscis slender, vertical, piceous, one-half the height of the head. Occiput and entire thorax rather lightly covered with cinereous pollen; humeri comparatively small and not so deeply constricted as in the other species; the usual black bristles present along the sides of the notum; scutellum with two long decussating and two short bristles; acrostichal and dorsocentral rows of minute whitish bristles present, with about six bristles to each row, the last dorsocentral large; no pleural hairs. Abdomen brown-black, sub-shining, last segments black hairy; hypopygium large, globular, flexed to the right. Coxae shining yellowish, legs yellowish, femora dusky on the outer half, legs provided with short white bristly hairs, middle tibiae with series of minute black setulae beneath, front femora much thicker than the others. Halteres dusky. Wings clear hyaline, veins strong, hind margin ciliate; first posterior cell ending at wing tip, and there somewhat contracted, marginal cell a little longer than the submarginal along the costa.

Described from a single specimen labeled, Grenada, W. I., received from Prof. J. M. Aldrich.

Tachydromia agens sp. nov.

Male and female. Length 1.3 mm. Head and thorax pruinose, legs dark fuscous, wings clear hyaline; antennae blackish; palpi sub-quadrate, pale; acrostichal and dorsocentral bristles conspicuous, scutellum with four white bristles; hypopygium terminal.

Front broad above, narrow and sub-parallel below, cinereous; ocelli small, ocellar bristles small; occiput lightly pollinose, its cilia white and conspicuous; antennae small, black, the basal joint blackish, arista almost terminal, short, although four times the length of the antenna, microscopically pubescent. Eyes completely contiguous on the face, deeply but narrowly excised at the antennae, facets nearly uniform, those below larger. Palpi of male yellowish, one-half longer than broad, with three long terminal white hairs, in the female the palpi are dusky but with a white sheen. Proboscis black, no longer than the palpi, projecting somewhat forward.

Thorax cinereous pollinose, humeri round, not quite as broad as the interhumeral space, the furrow not deep except behind; all the thoracic bristles white, the acrostichal and dorsocentral rows well developed, the lateral bristles comparatively short, about a dozen in front of the wings· scutellum with two long and two short white bristles; no pleural bristles. Abdomen sub-shining olivaceous black, with sparse stubby whitish hairs, the lateral margins of the intermediate segments with the round black pits characteristic of *Coloboneura*, *Parathalassius*, etc. Hypopygium closed, terminal, elongate. Coxae shining, posterior ones piceous, front coxae fuscous and with white hairs; legs dark fuscous, with whitish pubescence, middle tibiae setulose beneath, front femora somewhat the thickest, reddish beneath. Halteres yellowish; tegulae with a few white cilia. Wings clear hyaline, veins strong, hind margin short ciliate, marginal cell long, third and fourth veins parallel.

Type male collected on a windowpane July 3, 1906, in my house at Pullman, Washington. Type female taken in a wheat field nine miles west of Baird, Washington, June 23, 1908. This species was noticed actively running about the ground and stalks in wheat fields in several places in Central Washington. I have also five mounted paratypes which I collected at Lynden, Baird, and Pullman, all in Washington State.

Tachydromia universalis sp. nov.

Black, sparsely and lightly dusted; wings nearly uniformly hyaline; arista subterminal, the basal antennal joint red; palpi broad, white; legs reddish, variegated with brown; halteres yellow.

Male and female. Length 1.75 mm. Black, shining, lightly dusted with a gray pruinosity, which is more conspicuous on the pleurae, propleurae not glistening white. Antennae short, the two joints about equal in length, the basal joint red, the outer joint blackened, rounded oval, with a subterminal arista which is two and one-half times the length of the antenna. Front broad, its sides diverging above, the ocelli widely spaced. Upper facets minute, the lower ones larger. Palpi conspicuous, pendant, broad, white, with white hairs: proboscis black in the male, blackish in the females. Thorax comparatively broad, the humeri rather large but not long, the grooves rather distinct; acrostichals wanting, only a couple of weak dorsocentrals present near the scutellum; scutellum pruinose, and with two short bristles. Abdomen depressed, shining jet black, but overlaid with a light coating of gray dust: hypopygium large, shining, provided with a stout curved end-process which projects to the right; sides of the abdominal segments with minute muscle-attachment pits, as in *agens*. Legs reddish yellow, the upper side of the hind femora, the ends of the tibiae and the last tarsal joint darker; front femora thickened, hind femora scarcely reaching the last third of the abdomen. Halteres yellow. Wings rather broad, hyaline, but with a faint smokiness following the veins; veins strong, dark, but becoming yellowish at the base of the wing; marginal cilia minute; hind cross vein making an acute angle at the lower corner of the second basal cell.

Described from five specimens collected in the following widely separated localities: Chester County, Pennsylvania, June, 1902 (J. C. Bradley), Algonquin, Illinois, July 17, 1896 (Dr. Wm. Nason), and Austin, Texas.

This species is related to *agens* as is evident from the shortened broad thorax with the humeri less pronounced than in typical Tachydromias, the broad palpi, the widened front, subterminal arista, and pruinosity of the body. However it is readily distinguishable by the paler color of the legs, antennae, halteres and root of wing.

Catalogue of the Described Species of Tachydromia.[1]

1. *aemula* Loew, Zeitschr. Entom. Bresl. XVII. 22 (1863)........Eur. C.
*2. *agens* sp. nov.......................................Wash.
3. *aliterpicta* Becker, Act. Soc. Fenn. XXVI. 32 (1900).........Eur. S. C.
    alteropicta Becker, Berl. Ent. Ztschr. XXXIII. 343. (1899).
*4. *annulimana* Meigen, Syst. Bes. III. 69 (1822)...................Eur.
    albitarsis Zetterstedt, Dipt. Sc. 1. 313 (1842).
    arrogans Linnaeus, Zetterstedt, Ins. Lapp. 546. var. d. (1838).
    cimicoides Fabricius, Walker, Ins. Brit. I. 140 (1851).
    umbrarum Haliday, Ent. Mag. I. 161 (1833).
*5. *arrogans* Linnaeus, Fauna Suec. 1857 (1761)...................Eur.
    bifasciata Rossi, Fauna Etr. Mant. II. 77 (1794).
    cimicoides Fabricius, Spec. Ins. II. 447 (1781).
6. *brevipennis* v. Roser, Wuerttemb. Corresp. 1. 53 (1840).......Eur. C.
    ? *microptera* Loew, Ztschr. Ent. Bresl. XVII. 26 (1863).
*7. *calcanea* Meigen, Syst. Bes. VII. 95 (1838).................Eur. C.
    longipennis Loew, Ztschr. Ent. Bresl. XVII. 29 (1863).
*8. *calva* sp. nov.....................................Georgia.
9. *catalonica* Strobl, Mem. R. Soc. Esp. III. 319 (1906)..........Eur. S.
    var. *striatipennis*, Strobl. l. c. 320.
*10. *ciliata* sp. nov.......................................Mex.
*11. *connexa* Meigen, Syst. Bes. III. 70 (1838).....................Eur.
    cimicoides Fabricius, Meigen, p. p. Klass. I. 239 (1804).
    morio Zetterstedt, Ins. Lapp. 546 (1838).
12. *dichroa* Bezzi, Jenaische Denkschr. XIII. 183 (1908)..........Afr. S.
*13. *enecator* Melander, Trans. Am. Ent. Soc. XXVIII. 226 (1902)
    Alask., Wyom., Quebec.
14. *excisa* Loew, Zeitschr. Ent. Bresl. XVII. 27 (1863)............Eur. C.
15. *incompleta* Becker, Act. Soc. Fenn. XXVI. 33 (1901)..........Siberia.
*16. *insularis* sp. nov...................................Grenada.
*17. *interrupta* Loew, Zeits. Ent. Bresl. XVII. 19 (1863)...........Eur. S.
*18. *maculipennis* Walker, List. Dipt. Ins. III. 507 (1849) N. Am.
    pusilla Loew, Cent. V. 74 (1864).
    bimaculata Loew, Melander, Trans. Am. Ent. Soc. XXVIII. 204.
19. *minima* Becker, Act. Soc. Fenn. XXVI. 32 (1901)............Siberia.
20. *monserratensis* Strobl, Mem. Soc. Esp. III. 318 (1906).........Eur. S.
21. ? *morio* (Zetterstedt) Walker, Ins. Brit. I. 141 (1851).........England.

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[1] Those species figured on the plate are marked with an asterisk.

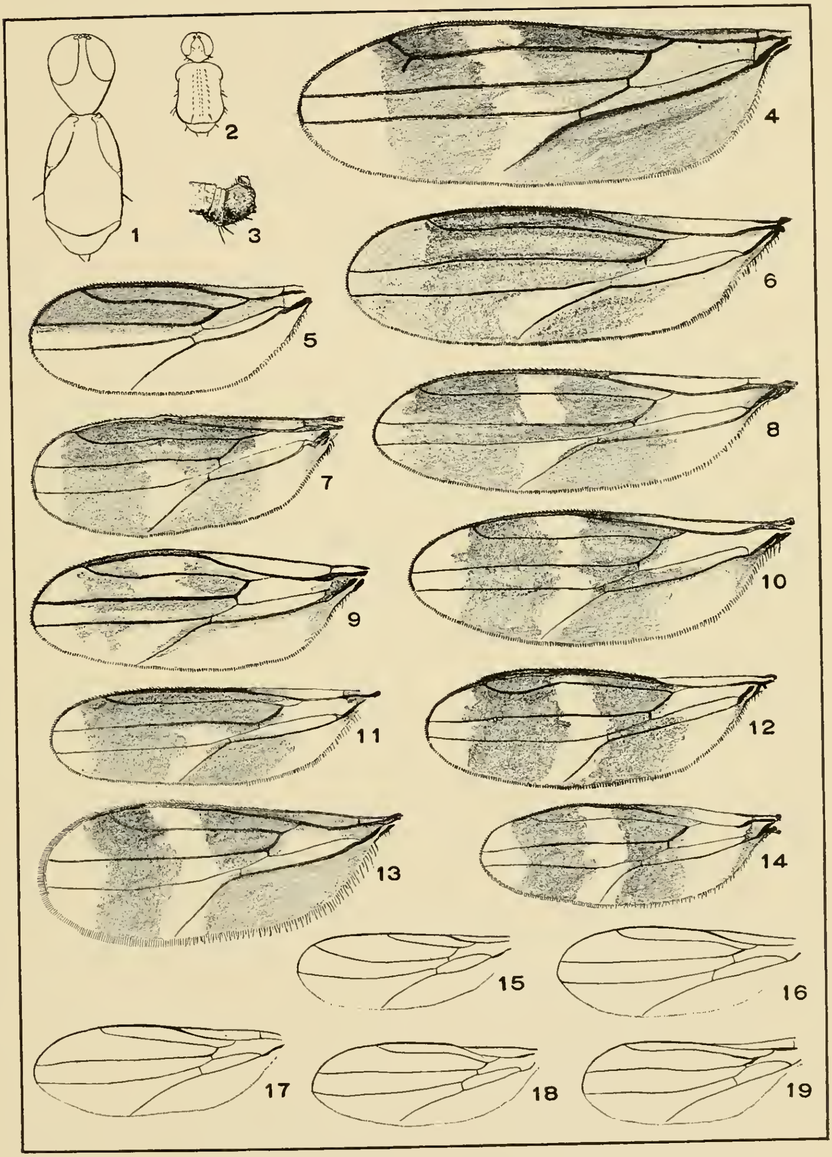
22. *ornatipes* Becker, Wien. Ent. Ztg. IV. 69 (1890)..............Tyrol.
23. *punctifera* Becker, Act. Soc. Fenn. XXVI. 32 (1901)..........Siberia.
24. *sabulosa* Meigen, Syst. Bes. VI. 342 (1830)...............Eur. N. C.
fenestrata Zetterstedt, Dipt. Sc. I. 318 (1842).
*25. *schwarzii* Coquillett, Proc. U. S. N. M. XVIII. 440 (1895). N. Am. W.
var. *diversipes*, var. nov..................................Tex.
*26. *simplicior* Wheeler and Melander, Biologia C. Am. Dipt. I. 375 (1901). Mexico
*27. *styriaca* Strobl, Mitth. Ver. Steierm. XXIX. 124 (1893)..........Alps.
var. *semifasciata* Strobl, l. c. 125.
28. *terricola* Zetterstedt, Kon. Vet. Ak. Handl. 81 (1819)........Eur. N. C.
29. *tuberculata* Loew, Zeitschr. Ent. Bresl. XVII. 19 (1863)........Eur. C.
30. *undulata* Strobl, Mem. Soc. Esp. III. 317. (1906)..........Eur. S. E.
*31. *universalis* sp. nov.......................................U. S.
*32. *varipennis* Coquillett, Proc. Ent. Soc. Wash. V. 266 (1903)......N. H.
33. *vitripennis* Bezzi, Jenaische Denkschr. XIII. 182 (1908)........Afr. S.

EXPLANATION OF PLATE 3.

The figures are drawn to practically the same scale of magnification, the camera lucida being used. The enlargement is about twenty diameters. As but four of the exotic species (*connexa* Meig., *incompleta* Beck., *ornatipes* Beck., and *punctifera* Beck.) have been figured, I have included drawings of the wings of those European species I possess.

Fig. 1. *Tachydromia enecator* Mel. Dorsal aspect of head and thorax.
" 2. " *agens*, n. sp. " " " " " "
" 3. " *maculipennis* Walker. Lateral aspect of hypopygium.
" 4. " *enecator* Mel. Wing.
" 5. " *maculipennis* Walk. Wing.
" 6. " *calcanea* Meig. Determination by Strobl. Europe.
" 7. " *connexa* Meig. Determination by Strobl. Europe.
" 8. " *styriaca* Strobl. Determination by Strobl. Europe.
" 9. " *interrupta* Loew. Determination by Strobl. Europe.
" 10. " *arrogans* Linn. Determination by Kertesz. Europe.
" 11. " *varipennis* Coq.
" 12. " *annulimana* Meig. Determination by Bezzi. Europe
" 13. " *ciliata* n. sp.
" 14. " *schwarzii* Coq.
" 15. " *simplicior* Wh. and Mel.
" 16. " *universalis* n. sp.
" 17. " *insularis* n. sp.
" 18. " *calva* n. sp.
" 19. " *agens* n. sp.

[Reprinted from PSYCHE, Vol. XVII, April, No. 2, 1910.]



MELANDER — TACHYDROMIA

Some New or Little-known Genera of Empididae.[*]

A. L. Melander, Pullman, Washington.

In the following pages are noted the occurrence in North America of several genera of the dipterous family Empididæ, that are not given in our publications. Their publication is given at the present time in order to explain more fully the citations that will appear in the forthcoming edition of Dr. Williston's Manual.

TACHYDROMIINÆ.

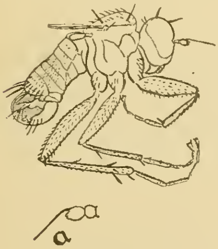
CHERSODROMIA Walker.[†]

This genus is known from six European species and one from Australia. We have one described species in our fauna that belongs to this genus. It is *Stilpon houghii* Melander, placed in Professor Aldrich's Catalogue of the North American Diptera in the genus *Coloboneura.*

THINODROMIA gen. nov.

Thinodromia inchoata spec. nov.

Thick-set, black, pruinose, black-bristly little species with dorsal arista and aborted wings. Eyes deeply emarginate at the antennæ, the facets uniformly large: face and front of male and female similar, of equal length and uniform breadth, gray pruinose; the hollowed vertex also gray pruinose, with three large ocelli, and strong ocellar bristles; occiput gray pruinose, the occipital bristles moderate; palpi large, flat, elongate-ovate, white pruinose, with a few black hairs, overlapping the proboscis; proboscis very stout, pointed, bent back; antennæ three-jointed, though the first joint minute, the third joint short-ovate with a long arista arising from near the middle of its dorsal side, the basal joint of the arista short, the outer long and microscopically plumose.



Thinodromia inchoata—a, antenna.

The pollen covering of the dorsum of the thorax more or less golden; mesopleura with a polished black area not pruinose; humeri not constricted; humeral and supra-alar bristles large, acrostichal and dorsocentral rows small, between the dorsocentrals and the pleura are a few irregular bristles; scutellum with two long and two outer short bristles; pleura without bristles.

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[*] Contributions from the Zoological Laboratory of the State College of Washington.

[†] (Ins. Brit. I. xx., p. 137, 1851.)

Abdomen short-cylindrical, but very robust, in the male, the bristles becoming longer posteriorly, those of the seventh segment nearly as long as the last four segments; each segment with a single large lateral pit; hypopygium large, globose, closed, somewhat asymmetrical and twisted to the right, the small apical organs nearly dorsal, the hypopygium is less pruinose than the anterior portions of the body, posteriorly with long black bristles.

Legs short, robust, piceous-black, rather closely covered with short black bristles, those of under side of front femora and of outer apical side of hind femora more prominent, all the femora moderately thickened, the tarsi somewhat flattened distally.

Wings vestigeal, more or less triangular in outline, horizontally extended over the abdomen, though reaching only to the third segment, opalescent gray, a spot including the marginal cell and another around the posterior cross vein infumated; veins yellowish, costal cell and the first two basal cells distinct, marginal cell much shortened, humeral cross vein distinct, no trace of anal veins, costa bristly.

Length, 1.25 to 1.50 mm.

This species was collected in some numbers at Monterey, California, by Professor J. M. Aldrich, in May of this year. The flies were running over the hot dry sands above the sea beach in company with *Parathalassius aldrichi,* hereinafter described. Professor Aldrich states that the species could be easily caught by scooping an individual, sand and all, in one's hand. The insect would run to the edge of the hand and could be readily dropped in the collecting bottle. It is rather strange that the swarms of these two interesting species should have been overlooked by the previous collectors in that neighborhood.

Professor Mario Bezzi in his paper, "La Riduzione delle Ali nei Ditteri,"* mentions but two species of Empididæ with shortened wings. Both belong to the same sub-family as the present form. *Tachista microptera* Loew lives about stones in the inland; *Chersodromia arenaria* Haliday is from the seashore.

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*Rendiconti d. R. Inst. Lomb., Vol. xxxiii, 1900.

SYMBALLOPHTHALMUS Becker.*

But one species, *S. dissimilis* Fallen from Europe, has been included in this genus. *Elaphropeza montana* Melander is a slender species much like *dissimilis* which may well be placed in the genus *Symballophthalmus.* There are also certain species described as *Platypalpus,* e. g. *canus, inops, hians,* which agree better with *Symballophthalmus* in that they lack the spur of the middle tibiæ and have the two basal cells of the wings equal.

It may be stated in this connection that *Elaphropeza* can be considered but as a subgenus of *Drapetis.* The type (*E. ephippiata*), which is the only European species, and the seven other species, all exotic, differ from *Drapetis* only in a comparative lengthening of the last antennal joint. Throughout the western United States we have a very common species of *Drapetis* (*D. unipila* Loew), which naturally shows some variation. An extreme form, which I reluctantly described as *medetera,* for I hesitated a long time before concluding it to be specifically distinct, has the third antennal joint twice the normal length. Inasmuch as there are intergrades it is unwise to give this single character generic value; *cf.* D. W. Coquillett, Proc. ent. soc. Wash., 1903, p. 265.

HYBOTINÆ.

PRORATES gen. nov.

Head globular but depressed, the face extremely short. Eyes contiguous on front in the male, the facets of the upper two-thirds enlarged: antennæ two-jointed, the first joint minute, the second compressed, conical, without a style or arista: proboscis rigid, shorter than height of head, projecting horizontally forward.

Thorax but little convex, one prealar, one supra-alar, and two scutellar, but no other bristles present: tegulæ minute, with white cilia. Legs slender, nowhere thickened, devoid of bristles, pulvilli minute. Abdomen slender; genitalia blunt, conical, not enlarging the diameter of the abdomen, entirely included within two lateral valves, no projecting parts.

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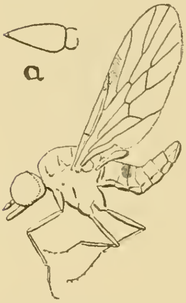
*Wien. ent. Zeitg., viii, 285, 1889.

Wings broad, anal angle rectangular, auxiliary vein ending in the costa at the middle of the wing, the costa extends to the third longitudinal vein; a black elliptical stigma surrounding the tip of the first vein; joint origin of the second and third veins arising nearer the humeral than the anterior cross vein; third longitudinal vein furcate before the middle of the first posterior cell: discal cell pentagonal, emitting two posterior veins of which the anterior is furcate; none of the posterior veins attain the wing margin; all the basal cells large, the discal cell small; anal cell longer than the second basal, its outer angle acute, anal vein reaching the wing margin.

Prorates claripennis nov. spec.

Male.—Length, 3 mm.—Black over all, dorsum of thorax olivaceous, with two fuscous vittæ, pleura and occiput lightly cinereous, abdomen not dusted. Occiput and abdomen with very fine pale scattered hairs. Legs entirely black. Wings pure hyaline, the stigma and veins blackish. Halteres black.

Two males, collected by Mr. H. L. Viereck, at Highrolls, New Mexico, June 12 and 13, 1902.



Prorates claripennis—a, antenna.

OCYDROMIINÆ.

PARATHALASSIUS Mik.

The genus *Parathalassius* was erected by Professor Joseph Mik* for a small silvery-gray species collected on the sands near Venice, in May. The species was found in a search for the Dolichopodid *Epithalassius*, but it was not discovered until the collected material was worked over, owing to a remarkable resemblance between the two species. Only females of the Empidid were taken, although apparently the species was very common.

In May of this year Professor J. M. Aldrich chanced on a similar silvery-gray form sporting on the arid sands at Monterey, California. Although no specimens of the European species are at hand for comparison, the agreement of our form with Professor Mik's description makes us believe the two forms to be congeneric. Like so many of the other Diptera living on the sand,* *Parathalassius* is conspicuous by its dense coating of pollen. Even the hairs and bristles are glistening white, so that the males especially, when viewed from in front, are ornate with a silvery sheen.

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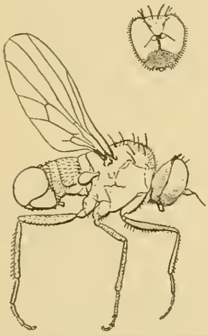
*Wiener Entomologische Zeitung, X Jahrg., p. 216, 1891.

The European species (*P. blasigii*) possesses several conspicuous white hairs on the under side of the hind femora, and these are lacking in the California form. Moreover, in *blasigii* the first posterior cell is narrowed at its apex. Otherwise, our species tallies well with Mik's description.

Parathalassius aldrichi sp. nov.

Male.—Length, 2.75 mm.—Entirely silvery-gray pruinose, all the bristles white. Vertex broad, concave, silvery pruinose: ocelli widely separated; one pair each of vertical, frontal, and ocellar bristles; face very narrow below the antennæ, concave, broadening at the convex clypeus, closely covered with short silvery-white pubescence, lower facets of eyes large, those of the lowermost third concealed by a dense covering of silvery-white scale-like hairs. Eyes not at all emarginate at antennæ. Antennæ black, three-jointed, though the first two joints are minute, third joint short-oval, pointed, with a long terminal bristle-like arista. Occiput silvery-gray pruinose, occipital bristles seriately arranged below, and forming a ciliate fringe to the eyes. Proboscis and palpi minute, blackish.



Parathalassius aldrichi and face of male.

Thorax silvery-gray pruinose, the dorsum with scattered short white hairs, and with eleven pairs of short achrosticals, six pairs of long dorsocentrals, three pairs of supra-alar and three long humeral and posthumeral bristles: scutellum with four marginal bristles, no pleural bristles.

Abdomen short, with numerous white hairs, when viewed from above or the right, with but four visible segments, the second segment longest and bearing a basal transverse row of black pores. Hypopygium very large and globular, comparativey bare though pruinose, asymmetrical,

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*e. g. *Lipochaeta, Thinophila, Thereva, Stichopogon,* etc., and the Empidid genera *Schistostoma, Coloboneura, Halsanalotes,* and *Chersodromia.*

attached to the left side of the body and bent forward and to the right, thereby crowding the small fifth, sixth and seventh segments to the left of the median line.

Legs slender, white bristly, middle tibiæ with small white apical spurs, the joints of the middle tarsi with small black apical spurs, under side of front femora and sides of hind femora ciliate with longer white bristles; pulvilli broad, empodium hair-like.

Halteres white. Wings whitish, veins strong, blackish, less dark basally, base of costa with a few white bristles, third longitudinal vein simple, four posterior cells, anal cross vein perpendicular to the anal vein.

Female.—Differs from the male as follows: Facets of eyes uniform, nowhere concealed by pubescence. Abdomen with five dorsal flattened segments, its apex jet black.

Over two dozen specimens of this species were saved by its collector. The type locality is the dry sands in back of the beach at Monterey, California. It gives me much pleasure to be able to dedicate this species to my dear friend and neighbor, Professor J. M. Aldrich, who discovered this interesting fly, and to whom we are indebted for a large proportion of what we know of the species of this family.

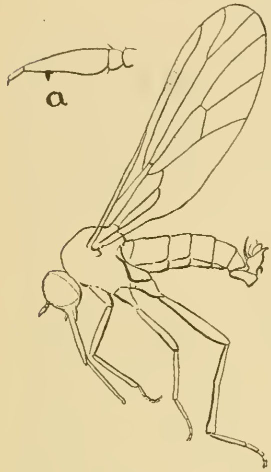
Parathalassius candidatus sp. nov.

After the description of *Parathalassius* was sent to the Entomological News, Professor Aldrich discovered among his collections another specimen of the genus, but which, on account of its larger size and more bristly appearance, is distinct from the Californian form. This individual, a female, was collected at Friday Harbor, San Juan Co., Washington, during the summer of 1905. Professor Aldrich is its discoverer also.

Female.—Length 3 mm., length of wing 3.25 mm.—This species differs from the preceding only as follows: Face slightly broader; hairs of occiput more dense. Dorsum of thorax with two narrow black vittæ, each of which is bounded by rows of bristles, so that there are four rows of dorsocentrals, with about fourteen bristles to each row. Between the acrostichal bristles and the humeri is a close aggregation of short bristles, which are represented in *P. aldrichi* by a few bristles only. Scutellum with six marginal bristles. The three black pits along the lower edge of each abdominal tergite are large and conspicuous. Ovipositor large, trough-like, exserted backwards from under the last segment. Bristles of legs stronger, not recumbent but projecting; spurs of middle tibiæ much reduced; hind metatarsi somewhat compressed; tarsi entirely black. In *aldrichi* the base of the metatarsi is somewhat yellowish. Anal vein three times the length of the anal cross-vein, in *aldrichi* it is less than twice as long as the cross-vein.

EMPIDINÆ.

TOREUS gen. nov.



Toreus neomexicana—a, antenna.

Male.—Entirely devoid of bristles. Eyes broadly separated, the lower facets larger: basal joint of antennæ small, last joint twice as long as the basal joints together, compressed conical, rather blunt; the style one-eighth the length of the third joint. Proboscis three times the length of the head, the rigid rostrum three-fifths the length of the labella: palpi short and incumbent. The proboscis extends downward and somewhat forward, and not backward, in the dried specimen.

Thorax entirely without bristles, no metapleural setæ. Abdomen robust, cylindrical, somewhat depressed apically, consisting of but six segments, the seventh forming a horizontal inverted hood-like peduncle to the hypopygium; no pits visible on any segment: hypopygium consisting of two triangular chitinous lateral clasping valves, which enclose a pair of upright decussating flattened filaments; intromittent organ curved and pointed, projecting downward from between the bases of the lateral valves; arising from the inner base of the hypopygium are a pair of curved slender diverging filamentous appendages which project above the height of the hypopygium.

Legs not long, without bristles, but with fine hairs, without apophyses or thickenings, front metatarsi two-fifths the length of the hind ones, hind tibiæ bent outwardly at their middle, pulvilli small.

Wings rather broad, anal angle broadly rounded, costa encompassing the entire wing, anal vein not or but little continued beyond the anal cell, auxiliary vein straight, vanishing at the middle of the wing, remaining veins attaining the wing margin, the two basal cells equal in length, the anterior branch of the third vein sinuous, rather long, the second submarginal cell but slightly longer than the first along the costa.

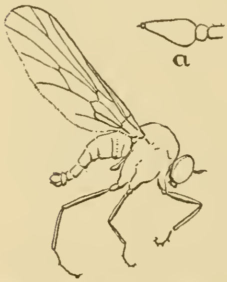
Type: *Empis neomexicana* Melander.

ANTHEPISCOPUS Becker.*

Becker has described two European species of *Anthepiscopus, caelebs* and *ribesii,* and there is one from New South Wales (*antipodalis* Bezzi). We have a species collected at Seattle, Washington, which agrees with the description and figure of *ribesii,* but in the absence of typical specimens for comparison I hesitate before deciding as to its specific identity.

HESPEREMPIS gen. nov.

Male.—Eyes separated, broadly above and narrowly below the antennæ, the facets uniform in size. Antennæ inserted high, the triangular front therefore short, three-jointed, the first two joints together as long as the third, the third joint conical, compressed, with a short two-jointed style. The first joint of the style is thick, the second very slender. Proboscis very short, sharp and incurved, as in *Hormopeza,* etc. Palpi broad, slightly longer than the proboscis, and recumbent upon it, the upper surface with a few fine hairs. Ocellar triangle without bristles, occiput with a few fine short hairs, face bare.



Hesperempis mabelae Mel.—a, antenna.

Thorax entirely without bristles, scutellum with six fine marginal hairs, metapleura bare. Abdomen slender, provided with few fine marginal hairs only; a transverse series of minute pits present at the base of the second abdominal segment: hypopygium terminal, flattened above, globular otherwise, not enlarged, entirely enclosed in a pair of convex lateral pieces, with no dorsal or terminal processes. Legs slender, simple, rather sparsely provided with fine pubescence, but entirely devoid of bristles; pulvilli small, empodium microscopic.

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*Wien. ent. Zeitg., X., 281, 1891.

Wings long slender, anal angle obtuse, not prominent, costal vein encompassing the entire wing, auxiliary vein straight, vanishing at the middle of the wing, stigmal spot faint, elongate, third vein branched, the anterior branch long, as in *Hilara*, discal cell narrow, acuminate apically, second posterior cell narrowed at the base, the contact of the third and fourth posterior cells with the discal cell equal, anal vein shortened, anal cross vein recurved and fused with the anal vein.

This description is drawn from an enigmatical little fly described as *Rhagas mabelae.* The insect is evidently an Empidine, but can not be assigned to any genus hitherto described. Its nearest relatives are *Rhagas, Haplomera, Hilarempis* and *Hilara.*

The main characters by which these genera differ from *Hesperempis* are herewith given:

Rhagas: Eyes of male contiguous; body with macrochætæ; anal angle of wing rectangular.

Haplomera: Femora thickened; third antennal joint long and nearly cylindrical.

Hilarempis: Body and legs with macrochætæ; anterior branch of third vein short.

Hilara: Auxiliary vein short and bent forward at tip.

In the Transactions of the American Entomological Society for 1902, page 277, I associated *Empis conjuncta* Coquillett with the present species as the American species of the genus *Rhagas* Walker. Mr. Coquillett* subsequently assigned *Synamphotera* Loew, which is a genus of the sub-family Hemerodromiinæ, as a synonym of *Rhagas,* and in his table stated that *Rhagas* has the anal cross vein perpendicular to the wing axis. In this he was in error: both forms are valid genera, in no ways related, for *Rhagas* is clearly an Empidine. I have since seen *Empis conjuncta.* It and *Empis triangula* Coquillett are normal species of the genus *Iteaphila.*

Through the kindness of Dr. K. Kertèsz, of the Hungarian National Museum, I have been put in possession of both sexes of *Rhagas unica* Walker, the type species of the genus. It is quite a different form from *mabelae.* Its salient characteristics

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*Proc. Ent. Soc., Wash., 1903, p. 257.

are the following: Wings broad, anal angle strongly rectangular. Eyes of male contiguous. Arista, nearly one-half the length of the third antennal joint, its basal segment much thickened and many times longer than the minute, bristle-like apical portion. Dorsum of thorax with the usual rows of small but distinct macrochætæ; those of the scutellar margin larger and six in number. Hypopygium terminal, small, but open, consisting of a pair of lateral slender curved and pointed valves, surrounding the sharp penis, and a basal dorsal pair of erect prongs, like those of *Itcaphila,* etc.

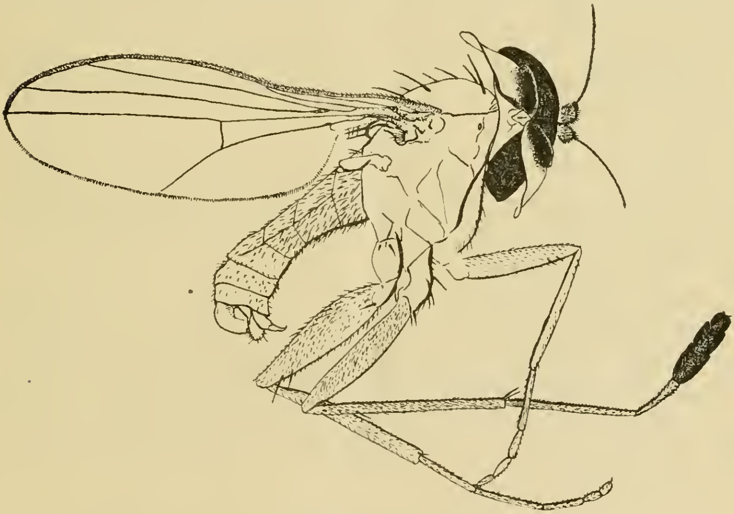
Mr C. W. Johnson

An Interesting New Chrysotus.

[Contributions from the Zoological Laboratory of the University of Texas. No. 42.]

By A. L. Melander.

Chrysotus philtrum sp. nov. *Male.*—Metallic green species with yellow legs. Head large, hemispherical, wider than the thorax: eyes large, narrowly contiguous below the antennæ, facets moderate, gradually larger below. Antennæ short, yellow, the first two joints short, simple, transverse, first joint bare, second and third joints bushy with black hairs, the terminal hairs equal in length to the third joint; third joint slightly compressed, rounded conical, short, equalling the length of the other two joints together, its terminal black arista as long as the eye-height, sparsely beset with short hairs, the distances between the apical ones slightly exceeding the length of these hairs. Face obliterated below the antennæ, becoming elongate-triangular lower down, small, black, vertex broad, with violet-blue-green reflections, the two ocellar bristles strong, recurved, an occipital incurved bristle present on each side of the vertex, postoculars wanting, postocular cilia wanting, the sparse hairs dusky below. Occiput with a violet tinge. Proboscis short, black, concealed beneath the base of the enormously dilated and flattened, subulate palpi, palpi two and one-half times as long as wide, literally projecting beyond the margin of the head, entirely flat, the base, rounded, broad, black in front, the outer half white, excised in front, lanceolate, the blunt tip twisted, the entire palpus covered with fine silvery sericeous hairs



Chrysotus philtrum.

The middle tarsus and the head are twisted to show the ventral aspect.

which give even to the black base a glistening silvery color when viewed from certain directions.

Thorax quadrate, humeri rectangular, dorsum metallic green, slightly brassy towards the roots of the wings. Acrostichals short and sparse, approximated into a single median series; the inner row of dorsicentrals with five moderate bristles, the outer row with four; a few humeral bristles present: scutellum with two distant long bristles: posterior portion of mesonotum but little depressed: entire pleura slaty with cinereous dust. Abdomen depressed basally, metallic brassy green, entirely but rather sparsely covered with short stiff black hairs. Hypopygium small, terminal, compressed, concolorous with the remainder of the abdomen, bare. The sixth ventral emits a pair of short, hooked, chitinous appendages, between which is a small fleshy hairy process.

Coxæ and legs yellow, the middle and hind coxæ somewhat darkened above on the basal half, second joint of middle tarsi white, three outer joints of middle tarsi black. Legs slender and comparatively long, provided with short dark hairs, middle tibiæ somewhat exceeding their femora, one-third longer than their metatarsi; middle metatarsi nearly as long as the remainder of the tarsus; middle and hind tibiæ provided with a glabrous streak on the outer edge, that of the middle tibiæ well-defined by a limiting series of short bristles, both tibiæ with a bristle on the basal third of the outer edge: last three joints of the middle tarsi strongly compressed, straight below but each joint arched and outwardly produced on the outer side: remainder of legs simple, ungues and pulvilli minute.

Halteres pale luteous. Tegular cilia short, sparse, dusky. Wings normal, clear hyaline, strongly iridescent, costa nowhere thickened, third and fourth veins parallel, posterior cross-vein short, perpendicular to the wing-axis, less than one-half the length of the outer portion of the fifth vein, sixth vein faint.

Three males. Length 1.75 mm. Chester Co., Pennsylvania, June 3, 1902 (J. Chester Bradley), Opelousas, Louisiana, and Austin, Texas, May 2, 1902. These specimens from such distant localities were taken in net sweepings, the Texan one in the rank herbage along the Colorado River at the base of Mount Bonnell.

This curious little fly has its nearest relatives in the genus *Chrysotus*, for which it shows its affinities by the contiguity of the eyes below the antennæ, the width of the vertex, the very short antennæ, the small pulvilli and the lack of true bristles on the hypopygium. The depressions of the mesonotum in front of the scutellum is not marked enough to exclude it from this division. Moreover, a number of *Chrysotus* recently described show greatly lengthened palpi, as *albipalpus* Aldrich, for instance. The first species described under this genus were stout and possessed short legs and rather broad wings, but forms later described show that a stature as slender as that of the present species may obtain also. Its narrowed wings and slender legs suggest an affinity to *Diaphorus*, but here also the middle legs are never longest, while the minute pulvilli, the obliterated face and the glabrous hypopygium preclude this genus.

Curiously enough all other genera of *Dolichopodidæ* have their palpi either incumbent upon the proboscis or hanging by its side. The enormous size of the palpi of *philtrum* in relation to the minute proboscis naturally can not allow of this juxtaposition and the palpi are free to grow laterally. In the genus *Orthochile* the palpi are ribbon-like, in *Diostracus* and *Aphrosylus* they are spoon-shaped, all the remaining members of this family have the palpi small and comparatively scale-like. Thus the present species departs in the shape as well as the size and orientation of its mouth-parts. As an interesting accompaniment of the enlarged palpi may be noticed the reduction of the orbital cilia. Of the other genera, the males of *Diostracus* alone have the palpi longer than those of the females. Should *philtrum* conform with the rule in this family what a remarkable animal the female must be ! But it is far more likely that this secondary sexual character is not repeated in the other sex, and that when the female is discovered she will present no characters at variance with typical *Chrysotus*. It is greatly to be desired that the courtship-habits of these species with enlarged mouth-parts be made known, and especially of this form which has the accompanying allurement of tarsal ornamentation.

Compliments of
A. Leonard Melander

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From The Canadian Entomologist, Vol. XXXII., May, 1900.

A DECADE OF DOLICHOPODIDÆ.*

BY AXEL LEONARD MELANDER, AUSTIN, TEXAS.

The ten species included in the present paper are all from the collection of Dr. Wm. M. Wheeler, under whose management this work was performed. As a slight token of my appreciation of his generosity and kindness, it pleases me greatly to dedicate one of the forms to him.

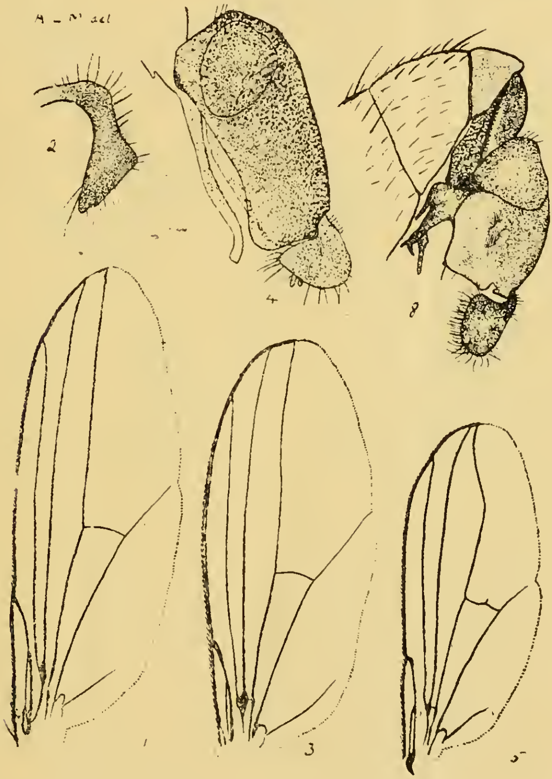

Fig. 9.

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*Contributions from the Zoological Laboratory of the University of Texas, No. 2.

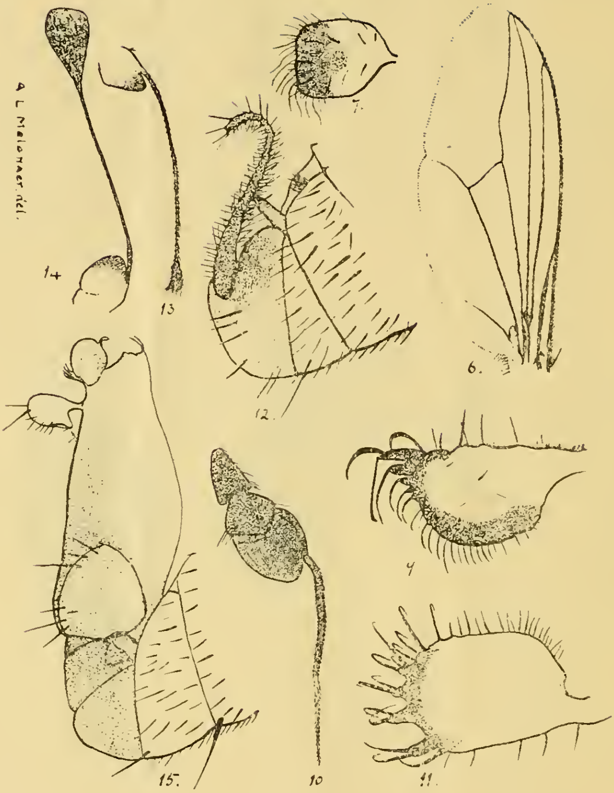

Fig. 10.

EXPLANATION OF FIGURES 9 AND 10.

1. Hercostomus vetitus, male wing.
2. Hercostomus vetitus, lamella of hypopygium.
3. Hercostomus anarmostus, male wing.
4. Paraclius hybridus, hypopygium.
5. Paraclius hybridus, male wing.
6. Tachytrechus protervus, female wing.
7. Tachytrechus protervus, lamella.
8. Tachytrechus volitans, hypopygium.
9. Dolichopus sincerus, lamella.
10. Dolichopus sincerus, male antenna, from inside.
11. Dolichopus misellus, lamella.
12. Nematoproctus venustus, hypopygium.
13. Gymnopternus mirificus, male antenna.
14. Gymnopternus phyllophorus, Lw., male antenna.
15. Pelastoneurus Wheelerii, hypopygium.

1. *Dolichopus sincerus*, n. sp. (Figs. 9, 10.)

Legs, except all the coxæ, hind tarsi and tip of hind tibiæ, yellow; cilia of inferior orbit black; fourth longitudinal not broken, but bent; antennæ black; legs plain; wings unspotted.

Male.—Length 4.5 mm., of wing 4 mm. Bright brassy-green. Face narrow, silvery-dusted, with a slight yellowish tinge on upper part, under the antennæ a little darkened. Palpi dark, silvery-dusted. Antennæ wholly black, third joint broadly ovate; arista a little longer than antenna, stout, tapering, not evidently pubescent. Vertex shining brassy-green, not dusted. Infra-ocular cilia pale yellow, not strong. Thoracic dorsum bright brassy-green, more cupreous along sides and with two cupreous stripes in front bounding the rather strong acrostichals. The velvety and the silvery spots present near base of wing. Abdomen shining, green, becoming more cupreous, then piceous towards incisures. Hypopygium with the lamellæ moderate in size, the lamellæ sub-triangular, whitish with wide black border and ordinary fringe of hairs. Pleura greenish, glaucous, and in various places with a cupreous reflection. Coxæ concolorous with the pleura, except at very tips; fore coxæ with black hairs and bristles on anterior surface; middle coxæ with white hairs intermixed with the black. Femora reddish yellow, slightly darker on upper surface, especially on hind femora toward tip; posterior four with a single preapical bristle; hind femora not ciliated beneath, although the small hairs are a trifle longer than usual; tibiæ yellow, except outer sixth of hind ones, where the black encloses a "dimple" on the outer side; tarsi plain, anterior four from tip of first joint and whole of hind tarsi black; pulvilli pale yellow, small. Wings grayish-hyaline, broad; costa elongate, thickened at tip of first vein; fourth vein with usual flexure; posterior cross-vein perpendicular to first segment of fifth vein and distant about three times its own length from tip of fifth; hind margin with rather evident fringing. Tegulæ and halteres yellow; tegular cilia black.

One male, collected by Dr. Wm. M. Wheeler, in Price County, Wisconsin, August 19, 1897.

Differs from *præustus* by the face being more silvery, vertex shining, fore femora not darker beneath, wings not blackened at tip, and the fourth longitudinal distinctly bent.

2. *Dolichopus misellus*, n. sp. (Fig. 11.)

Femora yellow, hind ones not ciliated; cilia of inferior orbit pale;

cilia of tegulæ black; wings unspotted, fourth longitudinal not broken; hind tibiæ tipped with brown; antennæ black, red below on first joint; fore coxæ reddish in front; fore legs plain; vertex violet-bronzed.

Male.—Length 5 mm., length of wing 4.5 mm. Face and palpi yellowish white. Antennæ lengthened, the joints subequal in length, black; first joint reddish below, third with the arista preapical, a little longer than antennæ. Vertex violaceous with a cupreous tinge. Infraocular cilia pale yellow. Dorsum of thorax and scutellum bronzed-green, shining, not dusted. Abdomen strongly compressed, bronzed-green, shining, slightly dusted, incisures not well marked. Hypopygium not large, lamellæ rounded apically, yellowish-tinged, narrowly black-bordered, and fringed. Pleura dark green, dusted, yet shining in places; the place of the usual velvety-black antealar spot is taken by a Y-shaped cupreous groove. Bases of middle and hind coxæ and posterior face of front coxæ piceous, glaucous; the anterior face of the front coxæ is dark yellow, sharply limited, without the usual coating of black hairs, but with three of the strong apical ones and a few pale hairs. Femora yellow, the hind ones not ciliated and with a single anteapical bristle; tibiæ yellow, except the hind ones at tip on inner side, an elongate apical "dimple" and a narrow glabrous streak on the posterior face of hind tibiæ, the dimple nearer the outside; tarsi plain, blackened from tip of first joint (hind ones missing in male); pulvilli whitish. Wings grayish-hyaline; veins not black; fourth vein obtusely, but sharply, bent; posterior cross-vein distant less than twice its length from tip of fifth; costa with a small, lengthened, node-like swelling beyond junction with first vein. Tegulæ and halteres light yellow, the former with very long black cilia.

The female differs from the male by the broader, grayer face; greener front; shorter tegular cilia; no costal node nor impression in hind tibia; front face of fore coxæ with black hairs. Hind metatarsus with basal two-thirds yellowish.

One male and one female from Natrona Co., August 31, 1895, and one female from Little Wind River, September 2, 1895, Wyoming; collected by Dr. Wm. M. Wheeler.

From the only species with which this could be confounded in any way *(setosus, platyprosopus, præustus, fulvipes* and *Coquilletti)* this species may be readily distinguished by the first short diagnosis.

3. *Gymnopternus mirificus*, n. sp. (Fig. 13.)

Very similar to *G. phyllophorus*, Loew, from which it differs by the following characters only: Face less ochraceous, more gray; third joint of antennæ more oval, its arista slightly pubescent, terminating in a very small lamella; the hypopygium is scarcely a third the length of that of *phyllophorus*, though this is due in part to shrinking.

One male specimen; collected by Dr. Garry de N. Hough in Massachusetts.

Hercostomus has always been an incongruous genus, formed of species rejected from several genera. The next two species differ from all the genera of *Dolichopodidæ* as now understood, but as they show evident affinity to the species of *Hercostomus*, they may be placed, at least provisionally, in that genus. The structure of the male hypopygium, the curvature in the third vein and the presence of oral bristles show a departure, more or less marked, from *Gymnopternus*. The following key is wholly artificial, but readily separates the species hitherto included in this much-abused genus:

Legs largely yellow .... 2.
Legs largely black .... 5.
2. Post-ocular cilia black .... 3.
Post-ocular cilia pale .... 4.
3. Face ochraceous.......................... *procerus*, Wheeler.
Face dark .... *vetitus*, n. sp.
4. Antennæ yellow............................ *latipes*, Aldrich.
Antennæ black.......................... *impudicus*, Wheeler.
5. Legs and lamellæ piceous..................... *unicolor*, Loew.
(Synonym *Gymnopternus pœnitens*, Wheeler.)
Legs and lamellæ fuscous.................. *anarmostus*, n. sp.

4. *Hercostomus vetitus*, n. sp. (Fig. 1, 2.)

Male.—Length 4.5 mm., of wing 4.5 mm. Face of moderate width, brownish. Palpi piceous, proboscis fuscous, surrounded with a fringe of bristles. Antennæ short, black, second and third joints together rounded obtusely pointed at tip, with a dorsal, short, gradually tapering, pubescent arista. Vertex dark greenish. Post-ocular cilia black; post-oral beard wanting. Dorsum of thorax dark blue-green, more shining posteriorly, scutellum blue-green, with surface hairy. Abdomen shining, dark blue-green, becoming slightly cupreous towards apex, incisures not darkened. Hypopygium large, sessile, piceous, slightly pubescent dorsally, the dorsal cardiform plate bristly; internal appendages reddish; lamellæ fuscous, darker towards tip, slender, not lamelliform, fringed with black hairs outwardly and at apex, at basal third a sudden swelling, then of regular width to the triangular clavate apex. Venter concolorous with the rest of the abdomen. Pleura piceous, glaucous. Coxæ more or less darkened, except at tips; fore coxæ less blackened on anterior and posterior surfaces, with short, black hairs besides the long apical bristles; middle coxæ with usual apical brush of hairs. Legs yellow, slightly infuscated towards tip of tarsi; first joint of fore tarsi in length equal to the three following together, of the middle tarsi the first joint equals the next two and half of the third following joints, the hind metatarsus is shorter than the joint next following; posterior femora with a single apical bristle. Wings subhyaline, third vein slightly and gradually converging towards the fourth; anal angle rounded; posterior cross-vein perpendicular to proximal segment of the fourth vein. Tegular cilia black, tegulæ and halteres yellow.

One male, from Clementon, N. J.; collected by Mr. C. W. Johnson, May 30, 1897.

5. *Hercostomus anarmostus*, n. sp. (Fig. 3.)

Male.—Length 3.5 mm., length of wing 3.25 mm. Face rather broad, gray dusted. Palpi and proboscis piceous. Antennæ black, third joint lengthened, flat above, rounded below, rather acutely pointed, bearing the dorsal arista. Vertex dark greenish, opaque. Post-ocular bristles black. No beard present. Thorax shining, dark green, with usual bristles. Scutellum concolorous, sparsely bristly, and with a marginal row of a few short bristles in addition to usual two. Abdomen green, somewhat brassy, incisures not darkened. Hypopygium piceous, pubescent, its cardiform plate bristly; internal appendages lengthened, reddish; penis pointed; lamellæ infuscated, crescent-shaped, much thickened at middle and evenly attenuated to the tip, covered and fringed externally with short black hairs, apex narrowly but distinctly margined with black. Pleura and coxæ, except tips, green, overlaid with glaucous. Front coxæ with black hairs anteriorly; middle coxæ with fewer hairs than usual. Legs infuscated, especially on upper side of all the femora, tip of hind tibiæ, and fore tarsi from tip of first joint; middle tarsi from apex of first joint black. Metatarsus of fore legs a little shorter than three following joints, of middle equal to two following, of hind legs shorter than next joint and with a few short bristles below. Wings subhyaline, slightly tinged with yellow anterior to third vein and bordering each vein;

veins strong, black, a thickening in the first vein where it reaches the costa ; third and fourth veins subparallel, the fourth vein ends slightly before the tip ; posterior cross-vein bowed outwardly, perpendicular to the last segment of the fourth vein, a slight lobe under the posterior cross-vein ; anal angle full, rounded. Halteres and tegulæ yellow ; tegular cilia black.

One specimen ; Chicago, Illinois, June 10, 1899 ; collected by Dr. Wm. M. Wheeler.

6. *Pelastoneurus Wheelerii*, n. sp. (Fig. 15.)

Male.—Length 3.75 mm., of wing 3 mm. Face of moderate width, narrowest in middle, green, thickly overlaid with silvery dust, becoming yellow toward antennæ. Proboscis piceous, palpi silvery, with a few hairs. Antennæ wholly reddish-yellow, slightly subfuscated at apex ; third joint short, ovate, bluntly pointed, arista short, tapering, with strong plumosity. Vertex largely green, dusted with yellowish-brown, on each side of ocelli a bluish space. Post-ocular cilia black above, white below; a few post-oral bristles present. Thoracic dorsum when viewed from the front dusted with yellowish-brown, wholly green except a purplish line on outer side of acrostichals, gradually wider behind, where it covers the dorsum except a pre-scutellar, triangular green spot. Above the base of the wing a ⌣-shaped black velvety spot extends forward, terminating above in a silvery spot visible only from above. Scutellum green, with brownish dust, glabrous. Abdomen green, broadly silvered at sides, toward base of each segment cupreous ; incisures blackened ; first segment laterally with a strongly-marked marginal row of erect black bristles. Hypopygium subpedunculate, rather slender, dorsal half obliquely marked with green, glaucous, apical half (= remainder) shining, translucent yellow, internal appendages fuscous, enlarged, appearing like a second set of lamellæ ; at base of these is a close fringe of yellow bristles ; penis not projecting ; lamellæ yellow, rather small, bent backward, circular at tip, fringed with light straggling hairs. Pleura concolorous with sides of abdomen. Fore coxæ pale yellow, silvery in front, and with a moderate coating of black hairs ; middle and hind coxæ glaucous basally on outer face ; middle coxæ with several black bristles anteriorly and hind coxæ with its usual bristle on outer side. Legs wholly yellow except toward tip of tarsi, where infuscation commences ; metatarsus of fore legs shorter than three joints following, of middle legs shorter than two following, and of hind legs shorter than next joint ; hind femora with a strong bristle on lower outer surface below the usual preapical one. Wings with typical neuration; the anterior region along the veins with a distinct darkening; posterior cross-vein inclines rather toward outer part of the fourth vein; anal angle full, almost rectangular. Cilia of the yellow tegulæ black. Halteres yellow.

One male taken along the Colorado River, south of Austin, Texas, October 7th, 1899, by Dr. Wm. M. Wheeler.

From allied forms the present species may be readily recognized as follows:

From *cognatus* by the green vertex, violet thorax, and shorter plumosity of the arista.

From *lineatus* it differs in the coloration of the thorax, the subpedunculate hypopygium and the lighter coloured lamellæ.

7. *Paraclius hybridus*, n. sp. (Figs. 4, 5.)

Male.—Length 3.75–4.25 mm., wing 3.5–4 mm. Face and palpi covered with a golden-gray dust, partially shining, face rather broad. Proboscis prominent, piceous, gray-dusted. Antennæ red; third joint slightly longer than broad, bluntly pointed, infuscated, especially towards tip; arista tapering, moderately plumose. Front cupreous, dusted with golden. Post-ocular cilia yellowish below. Dorsum of thorax and scutellum bronzed, opaque-dusted. Immediately above base of wing a black spot extends forward. Abdomen bronzed, somewhat shining, gray-dusted, especially towards sides. Hypopygium subsessile; lamellæ small, triangular, piceous except at base on dorsal side, where pubescence is also lighter. The usual lamellar filament is wholly wanting. Pleura glaucous. Coxæ with black hairs; fore coxæ yellow, except extreme base; middle coxæ glaucous largely, and hind ones less so, on outer side. Legs reddish yellow; tarsi darkened from tip of first joint; hind femora ciliate with short black hairs below. Wings grayish-hyaline; bend of fourth vein less sharply angulate than in *propinquus*. Tegulæ and halteres yellow; halteres with black cilia.

Female.—Length 3.75–4.75 mm., wing 3.25–4.25 mm. Coloration as in male.

Seven males and five females taken at Woods Holl, Mass., July 14th to 27th, 1899, by Dr. Wm. M. Wheeler.

This species was taken in the same netful with another *Paraclius* and a *Pelastoneurus*. The proportions taken were:

	Male.	Female.
Pelastoneurus lamellatus, Loew	15	18
Paraclius hybridus	9	5
Paraclius propinquus, Wheeler	21	13

The intermediate character of the new species seems to indicate a case of hybridism, but the data are not sufficient to bear out this supposition. *Hybridus* shows affinity for *Pelastoneurus* in the trend of the fourth longitudinal vein and in the lack of the filamentous appendages of the hypopygial lamellæ. The other characters are, however, Paraclian. It may be readily recognized by the following combination of characters: Antennæ largely red; base of fore coxæ narrowly dark; front bronzed; lamellæ of hypopygium triangular.

8. *Nematoproctus venustus*, n. sp. (Fig. 12.)

Male.—Length 4.75 mm., wing 4.5 mm. Face narrow, of nearly equal width, reaching three-fourths of the distance from the antennæ to the lower corner of the eye, covered with silvery dust. Palpi small, yellow, inserted at sides of proboscis. Proboscis piceous, sparsely pubescent. Antennæ short, reddish; first joint longest, glabrous; third ovate, short, with dorsal, long, bare arista (pubesence scarcely perceptible under higher power). Front shining green, the white of the face encroaching along the sides above the antennæ. Post-ocular cilia yellow; lower occiput with long yellow hairs. Eyes hairy. Thoracic dorsum and scutellum brilliant green, slightly dusted anteriorly, and with faint indications of median cupreous stripings; above the base of the wing a velvety black spot present, stronger anteriorly. Abdomen hairy, incisures blackened; first segment brassy green, second and third translucent yellow, fourth cupreous becoming green, sixth green; hypopygium small, rounded, piceous, pubescent, terminal, with long, filiform, infuscated, hairy appendages; internal appendages inconspicuous; penis short, perpendicular. Pleura greenish, gray-dusted. Middle and posterior coxæ concolorous with pleura; anterior coxæ yellow. Legs yellow, except posterior tarsi and outer fourth of posterior tibiæ, which are infuscated; pulvilli not conspicuous Wings clear, broadest about the middle; last segment of fifth vein once and one-half the length of the cross-vein; cross-vein oblique; last section of fourth vein converging towards third, then subparallel towards tip, distant from third vein, and terminating at tip of wing. Halteres and tegulæ yellow; tegular cilia long, pale yellow.

One male specimen taken by Mr. C. W. Johnson, at Westville, N. J., June 6.

Though the genus *Nematoproctus* has been abandoned by European dipterologists, it may be reinstated, at least provisionally, for this species whose habitus is different from any North American *Diaphorus* with which genus *Nematoproctus* has been united. The genus has never before been recognized outside of Europe.

9. *Tachytrechus volitans*, n. sp. (Fig. 8.)

Male.—Differs from *Floridensis* as follows: Front thickly covered with brownish dust, face with ochraceous dust. First joint of antennæ, when viewed from behind, brownish; when viewed from the front, opaque-black, except inner projection. Ground-colour of thorax of a brilliant metallic copper-colour, which shines through the thick coating of brown dust. Pleura and coxæ heavier white-dusted. Hind femora dark up to very tip. Pulvilli relatively longer, snow-white. Abdomen more cupreous. Pedicel of hypopygium more slender; hypopygium with penis projecting, distinct; lamellæ of similar form, but without the long black basal bristles, and evenly and closely fringed on outer side with longer hairs. The spot at tip of wing arises at tip of third vein and passes back so that the fourth vein bisects it. The third vein arches posteriorly at outer fourth. The fourth vein bends backwards at tip. The posterior cross-vein is less oblique and more sinuate.

The female differs from the male in the same characters as in *Floridensis.*

One male and one female, from twelve miles north-west of Lusk, Wyoming; July, 1895; from the collection of the University of Kansas.

10. *Tachytrechus protervus*, n. sp. (Figs. 6, 7.)

Male.—Length 4.25 mm., of wing 4 mm. Face narrowed in middle, silvery-dusted, yellower toward antennæ. Antennæ large, yellow; first joint short, second and third fully developed; third joint rounded, infuscated above and toward tip, bearing the dorsal arista once and two-thirds the length of the antenna. Vertex brownish-velvety. Post-ocular cilia black above, pale yellow, slender below. Thorax piceous green; above the base of the wing the horizontal black velvety macule and anterior silvery spot are present, above the former the dorsum is cupreous. Abdomen dark green, silvery-dusted along sides, incisures well marked. Hypopygium piceous, lamellæ subrectangular, dark, hairy, evenly fringed with short black hairs, which are lighter dorsally toward base. Pleura black, silvery-dusted; metapleura prominent; coxæ concolorous except extreme tip, fore coxæ bronze-dusted in front. Legs black, except the following: Tips of femora below, basal two-thirds of middle and hind tibiæ, and front metatarsi, which are dark yellowish. The fore legs are ornamented as follows: Tibiæ thickened, dusted with yellow on anterior surface, and with longitudinal rows of short black bristles; tarsi compressed, first joint a little shorter than the rest together, pulvilli large. Wings hyaline; anal angle much fuller than in *angustipennis*; fourth vein turned forward toward third, ending considerably before the tip of the wing; posterior cross-vein distant its length from the apex of the fifth vein, bowed inward and surrounded by a very faint cloud. Tegular cilia black.

Female.—Length 5.5 mm., of wing 5 mm. Differs as follows from the male: Face ochraceous. Infra-ocular cilia a little stronger. Vertex, thorax, and abdomen a more brassy, brighter green. Red at tip of femora more spread, and at base of middle and posterior tibiæ more restricted; fore tibiæ yellow, with ordinary bristles; fore tarsi not compressed, first joint equal to next three. Wings with faint yellowish tinge, cross-vein more oblique.

One male from Clementon, N. J., May 10, 1896, and one female from Delaware Water Gap, N. J., July 8. Both specimens were received from Mr. C. W. Johnson.

The following combination of characters briefly distinguishes this species from all the known species of *Tachytrechus*:

Male artista without an enlargement; fourth vein curved forward, ending near third and distant from tip; cilia of inferior orbit pale; wings unspotted; antennæ largely red; fore femora plain, more or less yellow-tipped.

In 1878 Mik* established the genus *Macellocerus*, basing it upon *Tachytrechus mœchus*, Loew. From *Tachytrechus* this genus differed thus: "Zweites Fuehlerglied rudimentaer, das dritte klein, mit ausserordentlich verlaengerter, dorsaler Borste, welche am Ende schaufelfoermig erweitert ist. Der letzte Abschnitt der vierten Laengsader convergirt stark gegen die dritte, so dass die Muendungen dieser beiden Adern nahe einander stehen." The addition of *protervus* leaves *Macellocerus* based upon a single male character. Concerning the inadvisability of erecting a genus upon *mœchus*, Dr. Loew had already written.†

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*Zur Kenntnis der Dolichopodiden, Dipterologische Untersuch ungen, p. 5.

†Monographs of N. Am. Dolichopodidæ, p. 112.

teeth. In the front of each large lateral plate is a narrow dorso-ventral sclerite carrying the jaws. These are two in number on each side. The anterior one (the *mandible*) is large, strong, toothed terminally, and provided on the inner side with a large, softer, movable lobe. The posterior jaw (the *maxilla*) is less chitinous than the other; it is flat and provided at its outer angle with several papilla-like processes.

GYNANDROMORPHISM IN A NEW SPECIES OF HILARA.*

BY AXEL LEONARD MELANDER, AUSTIN, TEXAS.

While collecting insects in Western Wyoming during September, 1895, Dr. Wm. M. Wheeler chanced upon a very remarkable fly. This insect, *Dilophus tibialis* Loew, was taken among sweepings from the high grass along the borders of Hunter's Creek, at an altitude of about 8000 feet. The specimen was abnormal in the possession of an antennary appendage arising from the right fore coxa. Concerning this curious outgrowth Dr. Wheeler has already published a full account.†

With the same sweepings in which the *Dilophus* was taken were numbers of an undescribed species of *Hilara*, and among these was another abnormal specimen. As cases of malformation are rare, and especially so among insects, possibly on account of the number of ecdyses which these animals undergo, the occurrence of another teratological fly in the same locality in which the *Dilophus* was taken is of some interest. The specimens collected were stored away until recently, when I undertook to study them in connection with the other species of *Hilara*.

Like most members of the genus *Hilara*, the new species exhibits striking sexual dimorphism, that is, apart from the peculiar hypopygial modifications, the first joint of the fore tarsi is greatly enlarged in the male, while of normal shape in the female. This character, which is well-nigh universal in the genus, is, like other secondary sexual characters, subject to considerable variation in form and size among the various species, and is therefore of taxonomic importance.

On sorting the Wyoming specimens with regard to the separation of the sexes, an individual was discovered which, so far as external characters are concerned, is neither a male nor a female. This specimen has the abdominal styles of the female, while at the same time the front legs are modified as in the males. In other respects it is normal. Thus the front part of the body resembles the normal male, while the abdomen is exactly like that of the female. This case may be called "tandem" hermaphroditism. The figure illustrates the anomaly, together with the condition in a normal male, and a front leg of a normal female.

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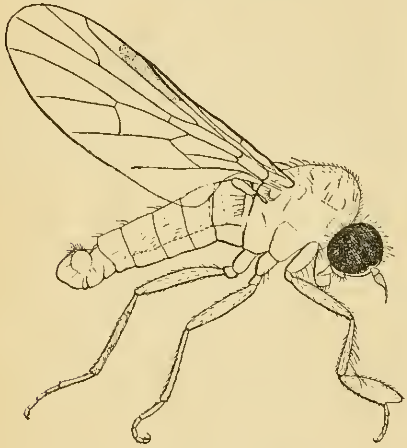
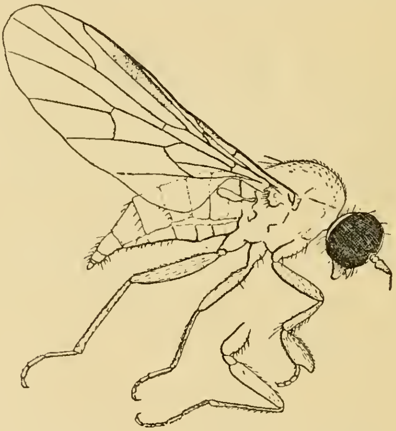
*(Contributions from the Zoological Laboratory of the University of Texas. No. 18).

† Archiv fuer Entwickelungsmechanik der Organismen, III. Band, 2 Heft, 1896.



Hilara wheeleri n. sp. Male.



Hilara wheeleri n. sp. Gynandromorphic individual. The detached leg is the fore leg of a normal female.

Although gyandromorphism is by no means unknown among insects, it nearly always occurs in the form of lateral hermaphroditism, as observed more commonly among Lepidoptera and less so among bees and ants. The occurrence of antero-posterior, or "tandem" hermaphroditism is rather rare, although quite as interesting as other cases of blending of sex. In this connection "Hahnenfedrigkeit" among female birds may be recalled.

As this species of *Hilara* has not been described, its diagnosis may properly be given in this connection.

Hilara Wheeleri *sp. nov. Male and female.* Length 3.5 mm. Opaque true-black, covered with a very fine grey-glaucous coating. Head, thorax and abdomen with a few pale short hairs besides the dark bristles. Antennae black, short, third joint short, conical, its arista equal to itself. Palpi testaceous, with pale hairs: proboscis piceous, generally less than one-half the head-height. Thorax not vittate, its short hairs irregularly, almost serially arranged: scutellum with four bristles, the inner pair long. Abdomen opaque black, most often compressed in the male and cylindrical or depressed in the female: no conspicuous bristles, the short sparse pubescence pale: hypopygium not of greater depth than the abdomen, sessile, rarely distinctly separated from the abdomen above, compressed, its lateral valves sub-glabrous, the dorsal filament thick, but almost always hidden. Legs fuscous to piceous. The males, as a rule, have the legs darker, but the fore tibiae are always fuscous. The pubescence is pale yellow: no conspicuous macrochaetae are present, though the hairs of the upper edge of the male fore tibiae are longer. The middle and hind coxae are black, the fore coxae more or less fuscous: tarsi black, the remainder of the legs variable in color from fuscous to piceous. The front metatarsi of the male enlarged, ovoid, the distal third of the inner side is excised for the reception of the remainder of the tarsus, which thus is not attached at the tip of the metatarsus. The front tibiae of the males are somewhat thickened. Wings cinereous-hyaline, stigmal spot faintly brown, neuration normal.

Seven males, twelve females and the gynandromorphic specimen. Dubois (IX. 6, 1895) and Little Wind River (IX. 2, 1895) Wyoming.

This species seems to be allied to *seriata*, Loew, of the Eastern States, which also has ovate metatarsi in the males. As Dr. Loew does not mention the place of articulation of the second joint, it may be presumed that it is terminal to the metatarsus as in the other forms of the genus. Moreover, the middle tibiae of the male *seriata* are provided with rather long pubescence, a character not observable in *Wheeleri*.

A NEW COCCID ON ROOTS OF RUBUS.

BY T. D. A. COCKERELL.

Phenacoccus rubivorus, n. sp. — ♀ — Hemispherical, with the form of a half-pea, distinctly segmented, pale pinkish, thinly covered with white mealy secretion; no cottony appendages. Boiled in liquor potassae, they stain the liquid amber yellow, and the skin becomes colorless. Anal ring with 6 hairs. Caudal tubercles very low and inconspicuous, with short bristles. Legs and antennae very pale brownish; claw with a small denticle on inner side; digitules slender, with small knobs. Antennae 9-jointed, formula approximately 92(35)6(471)8. The following measurements are in μ:—

Antennae segments; (1.) 36, (2.) 51, (3.) 48, (4.) 39, (5.) 45, (6.) 43, (7.) 39, (8.) 30, (9.) 69. Middle legs; femur + trochanter, 222; tibia, 174; tarsus, 90; claw, 27. Of course these measurements will vary, no two individuals being exactly alike.

The females studied contained very well-developed embryos. These showed small spines, round glands, and a small patch of spines on each lateral margin of each segment.

Hab.— Beulah, New Mexico, about 8,000 ft. alt., end of March, 1901, on roots of *Rubus strigosus*. Collected by Wilmatte P. Cockerell.

This interesting species does not have the superficial appearance of a Phenacoccus, though the antennae and legs are as in that genus. I suspect that when we know the male it will turn out to be congeneric with the little-known European *Tetrura rubi* described by Lichtenstein, concerning which see *Entomologist*, 1900, p. 86.

A NEW SPECIES OF CHRYSOPA FROM TEXAS.*

BY JESSE F. MCCLENDON.

Chrysopa bimaculata, sp. nov. Length to tip of wings 11.5 mm–13.5 mm., alar expanse 21–25 mm.

Mouth short, antenna slightly shorter

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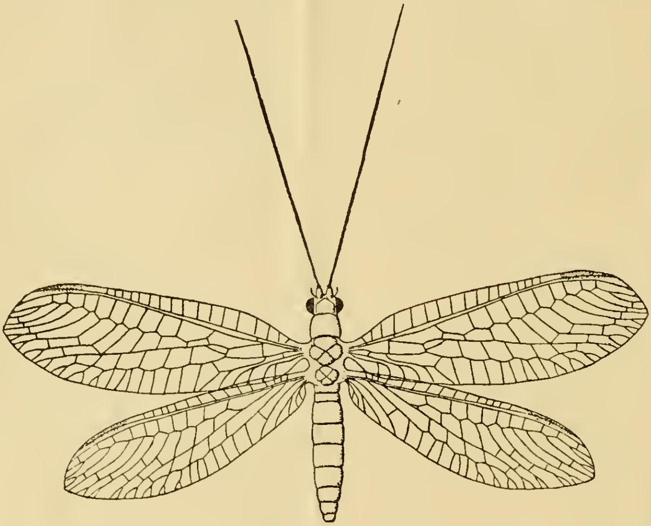
* (Contributions from the Zoological Laboratory of the University of Texas. No. 19.)

than the wing; prothorax broader than long; wings moderately narrow, anterior pair slightly pointed, posterior more acutely, in anterior wing divisory veinlet of third cubital areole exceeding the first cross-vein of the first radial sector.*



Face stramineous, vertex green, gular region stramineous, segments of palpi black, their articulations colorless, antennae stramineous, darker towards apex, first article with a red longitudinal line above; thorax green, paler beneath, prothorax with a luteo-rufous streak on each side from anterior to posterior margin; abdomen green; legs pale green, tarsi yellowish, ungues fuscous; wing veins green, in anterior wing all cross veins black or varied with black, in posterior wing costal cross-veins and a few others black, pterostigma light green.

Coloration of alcoholic specimen: green faded to pale yellow, line on first article of antennae fuscous, streak on prothorax faded out, black retained.

Four specimens from Laredo, Texas. August, 1900.

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* The position of this veinlet has been noted in descriptions of many species of *Chrysopa*, but on examining a number of specimens of *Chrysopa externa*, I found it to vary so much as to be of no value in determining that species. Whether it varies in *C. bimaculata*, I am unable to decide on account of the small number of specimens in my possession.

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A REVIEW OF THE NORTH AMERICAN SPECIES OF NEMOTELUS. PLATE 4.

BY AXEL LEONARD MELANDER, CHICAGO, ILL.

The genus Nemotelus, or Nematotelus, includes a group of rather small Stratiomyiidae generally of dark coloration, characterized by the prolongation of the lower part of the face. From the underside of this rostellum projects the slender and long drawn-out proboscis which has gained the generic name for these insects. However instead of being used as a weapon these mouth parts are admirably adapted for their function of feeding from the long throated florets of the cone-flowers. These small flies are not rare; where they occur they can be caught by dozens from the heads of their favorite flowers. From the few published records concerning this genus it would seem that in the Eastern States *N. carbonarius* is the most abundant. In Illinois *N. unicolor* is the prevailing form. This species also, has the greatest distribution, occurring to Hayti and Mexico. *Nemotelus canadensis* is commonest in Colorado, *N. crassus* in Kansas, while the Texas species are all equally abundant.

The European species of this genus have been divided into three groups by Dr. H. Loew, as follows: —

1. All the tibiae in part black,
2. Hind tibiae only in part black,
3. All the tibiae with almost no black.

On this basis the North American species would be grouped thus: —

1. *tristis*
2. *carneus*
3. *glaber*
4. *slossonae*
5. *bellulus*

1. *unicolor*
2. *carbonarius*
3. *canadensis*
4. *crassus*
5. *arator*
6. *bruesii*
7. *polyposus*

1. *pallipes*
2. *wheeleri*
3. *acutirostris*
4. *flavicornis*
5. *immaculatus*
6. *albirostris*
7. *trinotatus*

Of these groups the first seems incongruous, but the other two are well constructed. The species of the second have black males, stubby faces, and as a whole occur inland. The third, however, is a maritime group. The males have white abdomens and the faces are produced and pointed. *Nemotelus pallipes* Say is an anomalous species of the group. It is interesting to note that apparently so trivial a character as the relative extent of the dark color on the tibiae should be correlated with much more striking differences. Another remarkable correlation was noticed for the species in the collection. Those with black males (*N. unicolor*, *crassus*, *carbonarius*, *canadensis*, and *arator*) have the third vein of the wings simple; those species whose males have whitish abdomens have the third vein furcate (*N. wheeleri*, *trinotatus*, and *bellulus*). *Nemotelus bruesii*, however, is anomalous in this as well as in other respects. With this division in mind Mr. C. W. Johnson was asked to furnish data from the types of his species. *Nemotelus immaculatus* is injured, but *N. slossonae* and *flavicornis* have the third vein simple. Although these species have the abdomen white, it is nevertheless marked with a blackish design. We shall look forward with interest for an account of this characteristic in the other species.

In the preparation of this paper I have had access to the Hough collection of the University of Chicago. My own material supplemented by specimens from Dr. Wm. M. Wheeler has been of the greatest use. In conclusion I wish to thank Mr. Charles W. Johnson of Boston for his assistance in furnishing literature not accessible in Chicago and for the information regarding the types of his species.

KEY TO THE SPECIES.

Males: eyes contiguous, or nearly so . . . . 2.

Females: eyes widely separated . . . . 17.

2. Abdomen entirely black, or black with whitish marks . . . 3.

Abdomen whitish or whitish with black markings . . . . 11.

3. Antennae situated at the middle of the short and blunt rostellum; proboscis geniculate at its outer third, the outer part pilose; eyes contiguous and impressed along line of juncture; third vein furcate; black species with golden pubescence . . . . *bruesii*, sp. n.

Antennae situated at base of the longer and more acute rostellum 4.

4. Venter with a series of medial rufous spots; legs beyond base of femora yellowish; costal veins white; greenish black species . . *pallipes* Say

Venter immaculate; hind legs at least in part blackened; third longitudinal vein simple . . . . 5.

5. Body black, with no pale lateral markings on the thorax . . 6.

Thorax with pale lateral markings . . . . 8.

6. Body with purple tinge; hind tibiae black in the middle; tip of tarsi black *polyposus* Say
Body shining black, not purplish . . . . 7.
7. Front immaculate; eyes subcontiguous; base and apex of hind tibiae pale; anterior tibiae subfuscous . . . . . *carbonarius* Loew
Front bimaculate; base of all the tibiae pale . . . *tristis* Bigot
8. Pilose species with greenish luster . . . . . *arator*, sp. n.
Bare or nearly so . . . . 9.
9. Eyes contiguous; metallic blue-black; front spotted with white *canadensis* Loew
Eyes subcontiguous; front black . . . . . . 10.
10. Shining black species . . . . . . *nigrinus* Fallén
unicolor Loew
Shining blue-green species . . . . . . *crassus* Loew
11. Abdomen with black dorsal markings; thorax black with a lateral line; third vein simple . . . . 12.
Abdomen wholly whitish, unspotted; third vein furcate . . 13.
12. Thorax greenish black; abdomen with two central black spots in the fourth and fifth segments; posterior femora and tibiae brown in the middle *flavicornis* Johnson
Thorax black; abdomen with a basal black mark also; legs largely black, tip of femora, base and tip of tibiae and tarsi whitish *slossonae* Johnson
13. Proboscis, geniculate at the middle, the basal part enlarged; lateral line of thorax obsolete, humeral spot small . . . . . . 14.
Proboscis geniculate before the middle . . . . . . 15.
14. Legs yellow; antennae yellow, proboscis red . . *immaculatus* Johnson
Femora at least blackened; antennae black; proboscis black *trinotatus*, sp. n.
15. Face comparatively short, black; thorax shining, pubescence rather erect; eyes depressed along line of meeting . . . . *bellulus*, sp. n.
Face longer, yellowish above . . . . 16.
16. Length 3 mm.; antennae yellow except tip; thorax greenish; front linear *albirostris* Macquart
Length 5 mm.; antennae blackish; thorax slaty black, subshining, with appressed pubescence; eyes contiguous, not depressed along line of meeting . . . . *wheeleri*, sp. n.
17. Abdomen above with whitish lines or spots; third vein furcate 18.
Abdomen above wholly black; third vein not branched (except *bruesii*) 21.
18. Markings of abdomen arranged in a median series of triangular spots; head

long conical flattened, antennae inserted midway between the eyes and the tip of the rostellum; proboscis geniculate at the middle *trinotatus*, sp. n.

Markings of abdomen arranged in a double series; head in profile more or less hollowed out at the antennae; proboscis geniculate before the middle 19.

19. Abdomen with whitish markings beneath, at least in the middle; face very long and sharp, frequently paler above; thorax shining; 3 mm. *acutirostris* Loew

Abdomen black beneath; if the face is long the thorax is not shining 20.

20. Thorax granular, subshining, sparsely pubescent; facial projection long, acute; humeral mark small, frontal spots punctiform *wheeleri*, sp. n.

Thorax polished, nearly bare; face short, black; humeral mark large; frontal spots transverse *bellulus*, sp. n.

21. With a whitish spot on each side of the front above the antennae 22.

With no whitish spot on the front 25.

22. Facial projection shorter than width of eye; antennae inserted near its tip; lateral line of thorax obsolete *bruesii*, sp. n.

Facial projection equal to width of eye, antennae inserted near its base 23.

23. Lateral line of thorax well defined 24.

Lateral line of thorax obsolete *tristis* Bigot

24. Head and thorax nearly bare, subaenescent *canadensis* Loew

Head and thorax moderately pilose, with a greenish tinge *arator*, sp. n.

25. Sides of thorax with a yellowish line 27.

Sides of thorax not marked; black shining species 26.

26. Anterior tibiae subfuscous, hind ones black except extreme tip and base *carbonarius* Loew

All the tibiae vittate with black *carneus* Walker

27. All the femora and tibiae black; thorax with a greenish tinge *glaber* Loew

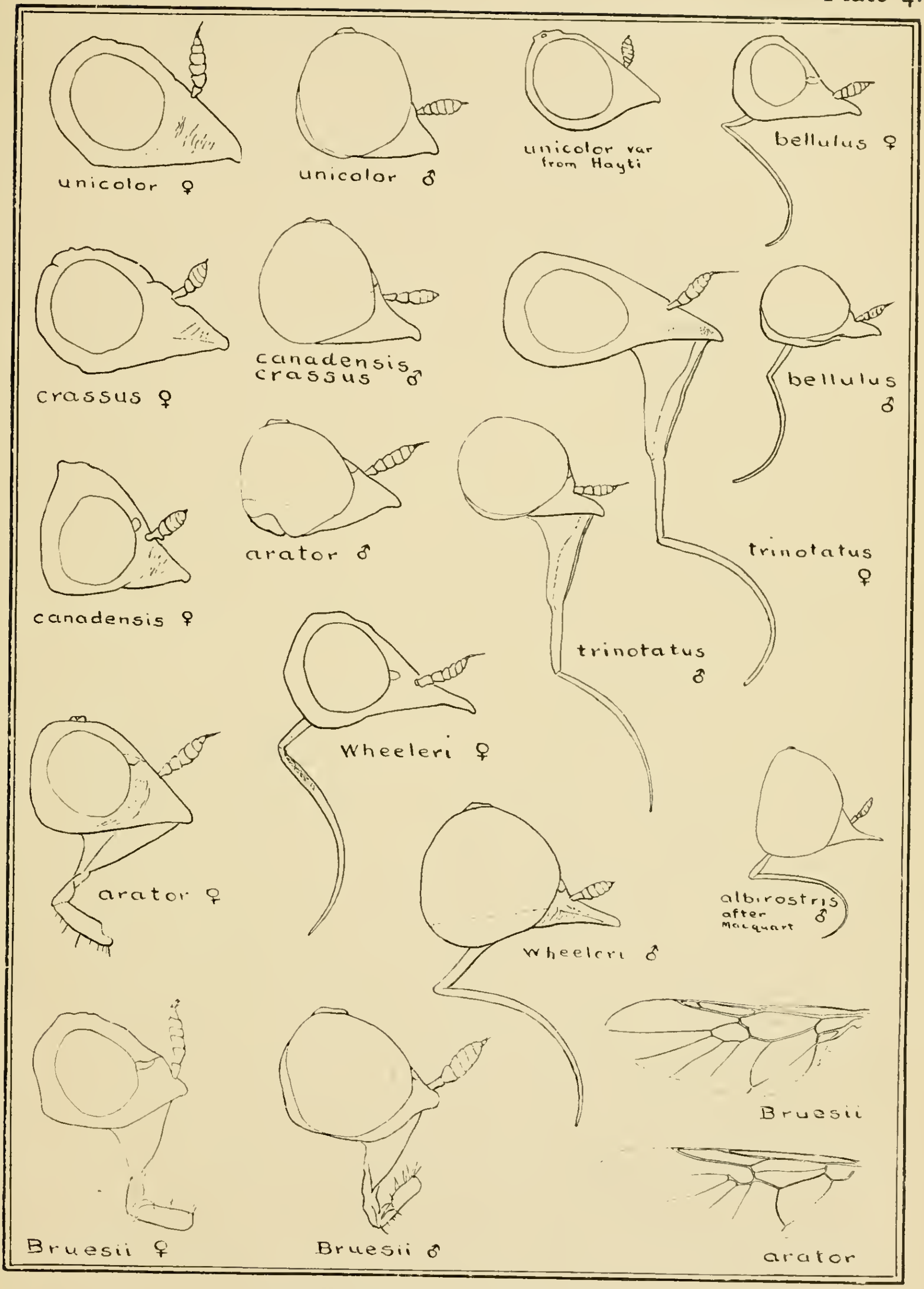
Front and middle tibiae rather yellowish 28.

28. Blue-green species 29.

Black, shining species *nigrinus* Fallén
unicolor Loew

29. Facial projection longer than width of eye *crassus* Loew

Facial projection shorter than diameter of eye *unicolor*, var.



MELANDER: — NEMOTELUS.

DESCRIPTIONS OF THE SPECIES.

1. Nemotelus crassus Loew.

Nemotelus crassus Loew, Cent. Amer. Diptera, iii, 10. (1)
Williston, Can. ent., 1885, vol. 17, p. 128. (2)
Johnson, List ins. N. J., p. 639. (3)

Female. Stout, of a greenish black somewhat metallic color, front not spotted, antennae black, the tip of the second joint yellowish, a lateral line of the thorax, the knees, the front tibiae, and all the tarsi pale yellowish. Length of body $2\frac{1}{12}$ lines (4.2 mm.), length of wing 2 lines (4 mm.).

Rather stout, bare, highly shining, greenish black, the color of the anterior part of the front and of the face merging to bluish rather than green. Front broad, immaculate. Antennae black, the tip of the second joint brownish or yellowish. Face produced into a rather large sharp cone. Lateral line of the thorax very slender, pale yellowish. Femora black, the tip, however, yellowish; the whole of the front tibiae and the broad base and narrow tip of the hinder ones yellowish, the intervening portion black; tarsi pale yellowish. Halteres white. Wings whitish, the thinner veins similar, the thicker ones very pale yellowish, submarginal cell of an opaque color. (*Translation.*)

Rhode Island (1); Kansas (2); New Jersey (3).
Profile of head of male and female figured on plate.

2. Nemotelus canadensis Loew.

Nemotelus canadensis Loew, Cent., iii, 12. (1)

Male and *female.* Clothed with short whitish hairs, shining, greenish black, submetallic, antennae black, the lateral line of the thorax very narrow, the tip of the femora, the tibiae except a median ring around the hind ones, and the tarsi yellowish.

Male. Eyes contiguous, frontal triangle yellowish, face drawn out.

Female. Front broad, on each side with a yellowish spot, sometimes faintly marked, face acute.

Length of body 2–$2\frac{1}{12}$ lines (4.–4.2 mm.), length of wing 2 lines (4 mm.).

Clothed with short and fine whitish hair, shining, greenish black, somewhat metallic. Head concolorous. Eyes of male contiguous, eyes of female separated on the broad front. The anterior frontal triangle of the male pale yellow above, the front of the female marked on each side with a pale yellow spot. Face of male produced into a moderately prolonged cone, of the female into a subacute one. Lateral line of the thorax whitish yellow, very fine. Abdomen margined with a dirty yellow narrow line sometimes obsolete. Femora black, yellow at the tip; tibiae yellow, the hind ones annulate with a black ring; tarsi yellow, the last joints frequently infuscated or blackened. Halteres white. Wings whitish, the stronger veins pale yellowish, the submarginal cell often of the same color. (*Translation.*)

Hudson Bay Territory, Fort Resolution, (Kennicott.) (1); Colorado, (Hough collection, C. F. Baker).

Profile of head of male and female figured on plate.

3. NEMOTELUS UNICOLOR LOEW.

Nemotelus unicolor Loew. Cent., iii, 11. (1)
Williston, Can. ent., 1885, p. 128. (2)
Williston, Biologia Centr.-Amer., Suppl. p. 251. (3)
Nemotelus nigrinus Fallén, v. d. Wulp, Tijdschr. entom., 1867, p. 126. (4)

Female. Bare, shining, black, antennae concolorous, front immaculate, a very slender lateral line on the thorax yellowish, femora black except the yellowish tip, anterior tibiae subfuscous, hind ones black, the base and extreme apex of all yellowish. Length of body 1¾ lines (3.5 mm.), length of wing 1⅝ lines (3.3 mm.).

Bare, shining, black. Front immaculate. Antennae black. Face produced into a rather large and sharp cone. Lateral line of the thorax pale yellow, very thin. The hind tibiae and the femora black, the tip of the latter and the base and apex of the former yellowish; anterior tibiae subfuscous, with the base broadly and apex narrowly yellowish, sometimes wholly pale yellowish; the last two joints of the yellowish tarsi sometimes infuscated. Halteres whitish. Wings whitish, the stronger veins very pale yellowish. (*Translation.*)

Illinois, (Le Baron) (1); Wisconsin (4); Pennsylvania, Arizona (2); Tabasco, Mexico. (3)

The male which has not been described before is similar to the female. The outline of the head is naturally different as represented on the plate. The thorax is sometimes decidedly pubescent with very fine whitish hair. Halteres often blackened.

Profile of head of male and female figured on plate.

This is the commonest species in Illinois: Chicago, Glen Ellyn, Algonquin, McHenry are the localities from which I have specimens. May to September. One female from Glen Ellyn has the facial prominence shorter than the head, the antennae reddish beneath and the knob of the halteres blackish. All the other females examined have a longer face, black antennae, and white halteres. Is not *N. unicolor* the form referred by van der Wulp to *nigrinus* Fallén? The descriptions of the European species apply very well to the North American specimens.

A single specimen in the Hough collection taken in Hayti seems closely related to *N. unicolor*. Were it not for the extended distribution of this species and the fact that the Glen Ellyn specimen of *unicolor* represents a similar variation, the West Indian example might be considered another species. Its peculiarities are the following: thorax with a black bronzed tinge; antennae brownish basally; face short, in length less than the width of the eye; length 2.25 mm. See figure. The specimen scarcely seems to be the female of any of the three species occurring within its geographical range. (*N. immaculatus*, *slossonae*, *flavicornis*.)

4. NEMOTELUS CARBONARIUS Loew.

Numotelus carbonarius Loew, Cent., viii, 6. (1)

Johnson, List ins. New Jersey, p. 639. (2)

Male and female. Bare, black, shining, antennae concolorous, front immaculate, no lateral line on the thorax, femora black except the yellowish tip, anterior tibiae subfuscous, hind ones black, base and extreme tip of all yellowish.

Very much like *Nemotelus unicolor*, but different in its smaller size and in possessing no pale line on the side of the thorax. Halteres subfuscous. Eyes of the male subcontiguous. (*Translation.*)

Length of body 1 lines (3.3 mm.), length of wing $1\frac{7}{12}$ lines.
Lenox, Massachusetts, (Osten Sacken) (1); New Jersey (2).

5. NEMOTELUS TRISTIS Bigot.

Nemotelus tristis Bigot, Ann. soc. ent. France (6), vii, 1887, p. 30. (1)

Male. Face produced as a cone. Black over all, shining; two whitish spots above the antennae, halteres white, knees, base of the tibiae, and the tarsi except the tip pale fulvous; wings hyaline, the strong veins at the base pale yellow.

Female. Very much the same.

Male. Face prolonged in a sharp cone, at least equal to the length of the head. Entirely shining black, two white spots situated above the base of the antennae; halteres with white knob; extremity of the femora, the knees, base of the tibiae and of the tarsi, of a very pale reddish; wings absolutely hyaline, except that the external veins are lightly tinged with yellow. (*Translation.*)

Length 4 mm.
California. (1)

6. NEMOTELUS GLABER Loew.

Nemotelus glaber Loew, Cent., x, 10. (1)

Female. Bare, shining, black, dorsum of the thorax and the scutellum faintly greenish, front immaculate, thorax with a very fine whitish lateral line, femora and tibiae black, tarsi white, the last two joints of the front ones and the last joint of the hinder ones fuscous, knob of the halteres black above.

Bare, shining, black. Front broad, unspotted. Antennae brownish black, towards the base dull red. Face produced into a rather stout acute cone. Dorsum of the thorax and the scutellum obsoletely green from a black ground color; the lateral line of the thorax very fine, whitish. Legs black, the knees dull whitish and the tarsi white, but the last two joints of the front ones and the last joint of the others fuscous. Halteres whitish, the knob black above. Wings whitish, the stronger veins very pale, the rest completely uncolored. (*Translation.*)

Length of body $1\frac{2}{3}$–$1\frac{3}{4}$ lines, length of wing $1\frac{7}{1}$–$1\frac{2}{3}$ lines.
Texas, Belfrage. (1)

7. NEMOTELUS CARNEUS Walker.

Nemotelus carneus Walker, Barnston's MSS, List dipt. ins., 3, p. 521. (1)

Female. Black, antennae black, legs yellowish, femora black, tibiae striped with black, wings whitish. (*Translation.*)

Body black, shining; head a little narrower than the chest; eyes piceous; mouth and feelers black; scutcheon unarmed; abdomen much broader, but not longer than the chest; legs tawny; hips and thighs black; tips of thighs tawny; shanks striped with black; wings whitish; wing-ribs tawny; veins and poisers pale yellow.

Length of body 1½ lines (3 mm.) of the wings 3 lines.

St. Martin's Falls, Albany River, Hudson Bay, (G. Barnston). (1)

8. NEMOTELUS PALLIPES Say.

Nemotelus pallipes Say, Journ. acad. nat. sci. Phila., vol. 3, 29. (1)
Ed. Lec., vol. 2, p. 52. (2)
Wiedemann, Auss. zweifl. ins., ii, 45, 2. (3)

Male. Greenish black, thorax tinged with green; nervures white.

Rostelliform process blued black; polished; antennae brown, at the base of the rostelliform process; front with a triangular white spot above the antennae; thorax punctured, a testaceous line before the wings and another each side on basal edge; poisers and scale pure yellowish white; costal nervure whitish; feet yellowish, base of thighs and middle of posterior edges of the segments of the venter rufous.

Length $\frac{3}{20}$ inch (3.8 mm.).

Pennsylvania. (1, 2, 3.)

9. NEMOTELUS POLYPOSUS Say.

Nemotelus polyposus Say, Journ. acad. nat. sci. Phila., vol. 6, 160. (1)
Ed. Lec., vol. 2, 356. (2)
Williston, Biol. Centr.-Amer. Dipt. Suppl., 251. (3)

Male. Black, feet yellowish; thighs black at base.

Body black, with slight tinge of purplish, polished; wings white; costal and basal nervures yellowish; poisers white; feet honey yellow; thighs except at tip black; tarsi with the terminal joint black; posterior tibiae black in the middle; venter immaculate.

Length not more than $\frac{3}{20}$ inch (3.7 mm.).

Mexico (1, 2); Mexico City. (3)

10. NEMOTELUS ARATOR, sp. nov.

Female. Olivaceous black, shining, densely pilose with fine dusky yellow hair; head with two transverse yellow spots above the antennae; vertex rounded into the front and on the occiput, facial projection conical, stout, subacute, moderately long, equaling the width of the eye, antennae black, inserted one third the distance out from the frontal spots; proboscis short, fleshy, geniculate at the outer third, the outer part hairy beneath. Thorax without a humeral macule, but with a pale lateral line. Abdomen concolorous with head and thorax, inornate. Femora black, except the knees, hind tibiae blackened in the middle, tarsi infuscated apically. Halteres yellow, the pedicel black. Wings whitish hyaline, the anterior veins testaceous, third vein unbranched, fourth posterior vein arising from base of discal cell.

Male. More pilose, with a more bluish reflection. Frontal spots small, contiguous, eyes contiguous for a short distance only, where they are impressed, facial protuberance much reduced, the antennae arising from its base, proboscis short. Otherwise similar to the female.

Length 4.5–5 mm.

Described from one male and one female from a larger lot of the same species collected by Dr. Wm. M. Wheeler, March 1897, in San Diego Co., California.

Profile of head of male and female and figure of wing illustrated on plate.

11. NEMOTELUS BRUESII, sp. nov.

Female. Black, closely covered with short appressed coarse silvery pubescence. Head short rounded conical; face short, two thirds the diameter of the eye, antennae inserted near the tip of the face, rather long, especially the first two joints, black, arista thick, bristly at tip; front with two narrow transverse white spots, proboscis short, but little longer than the length of the head, geniculate at its outer third, the outer part fleshy and hairy. Thorax with a small humeral spot; lateral line obsolete. Abdomen unmarked. Femora black except tip, tibiae darkened at middle, especially the hind ones, remainder of legs testaceous. Halteres blackened. Wings hyaline, the stronger veins testaceous, third vein furcate before its end; the fourth posterior vein arising at the basal third of the under side of the discal cell.

Male differs in the fine golden pubescence; face stubby, eyes scarcely touching; frontal spots triangular, subcontiguous.

Length 4 mm.

Described from numerous specimens collected by myself and by Mr. Charles T. Brues, my constant fellow-worker, during our stay at the University of Texas, Austin, Texas. This species is abundant during middle April, and shows special partiality for the flowers of *Lepachys columnaris*, the entire collection being made from the flowers growing on the University campus. The species is soon succeeded in the local fauna by *N. trinotatus*.

Profile of head of male and female and arrangement of venation figured on plate.

12. NEMOTELUS TRINOTATUS, sp. nov.

Female. Head long, flat from the tip to the strongly declivous occiput, conical, rather acute, no distinction between front and facial protuberance; totally black, shining, pubescence short appressed sericeous golden, moderately sparse; antennae black, inserted midway between eyes and tip of face; proboscis long, black, geniculate at the middle, the basal half membranous behind, the outer half curved. Thorax black with a very faint greenish tinge, its pubescence like that of the head but denser laterally, humeral mark small, lateral line very narrow. Abdomen black, not greenish, shining, bare, the first segment yellowish in front, the spot broadest medially, second, third, and fourth segments each with a median triangular white mark broadest posteriorly, that of the fourth segment continuous with the yellow hind margin, the entire abdomen margined with a white line broadest caudally and becoming attenuated toward the base of the abdomen; venter black shining, sparsely pubescent, immaculate but with a narrow whitish outline. The markings of the first two segments of abdomen sometimes obliterated. Femora black except the yellowish tip, posterior tibiae blackish in the middle merging into yellow at the base and apex, tarsi light yellow. Halteres white. Wings white, veins concolorous, third vein furcate at tip, fourth posterior vein arising at basal third of underside of the rather large discal cell.

Male differs from the female as follows: facial protuberance shorter and more slender, front with two contiguous white spots, antennae inserted at the base of the protuberance; eyes contiguous and slightly impressed along the line of contiguity. Hairs of thorax less sericeous, silvery. Abdomen wholly white. Hind tibiae with a black spot.

Length ♂ 3.5 mm.; ♀ 4.5 mm.

Described from numerous specimens of both sexes collected during May and June at Austin, Texas, by Mr. C. T. Brues and the writer. The species was abundant during the first weeks of June on the flowers of SAPINDUS, the "wild chinaberry tree."

Profile of head of male and female figured on plate.

13. NEMOTELUS FLAVICORNIS Johnson.

Nemotelus flavicornis Johnson, Proc. acad. nat. sci. Phila., 1894, p. 272. (1)

Male. Face and vertical triangle black, shining. Facial protuberance prominent, conical; antennae yellow. Facets of the upper half of the eye double the size of those of the lower. Thorax and scutellum greenish black, shining; humeri, and a narrow line from there to the base of the wings, yellow. Abdomen yellow, with a small black subtriangular spot in the center of the fourth and fifth segments; venter yellow. Legs yellow, posterior femora and tibiae with a medial band of dark brown. Wings hyaline, whitish, discal cell emits four veins.

Length 2½ mm.

Kingston, Jamaica. (1)

Mr. Johnson writes that the third vein is simple.

14. NEMOTELUS SLOSSONAE Johnson.

Nemotelus slossonae Johnson, Proc. acad. nat. sci. Phila., 1895, p. 304. (1)

Male. Face and vertical triangle black, shining; facial protuberance very prominent, conical; frontal triangle brown. The upper portion of the eye with large facets brown, the lower third with small facets blackish; antennae dark brown. Thorax and scutellum black, shining; a narrow, light yellow lateral line extends from the humerus to the posterior angle. Abdomen yellowish white; a central mark on the first segment below the scutellum, a dorsal triangle and a small spot near the lateral margin of the fourth, and the fifth except a narrow lateral and posterior margin black; in one specimen there is a minute brown dot near the anterior angle of the third segment. Venter whitish. Legs black; tip of the femora, base and tip of the tibiae, and the tarsi whitish; wings hyaline, whitish; discal cell emits four veins.

Length 3 mm.

Charlotte Harbor, Florida. March. (Mrs. Annie Trumbull Slosson.) (1)

This species also has the third longitudinal vein simple. (C. W. Johnson, *in litt.*)

15. NEMOTELUS ACUTIROSTRIS Loew.

Nemotelus acutirostris Loew, Cent, iii, 13. (1)

Female. Black, shining, clothed with fine whitish hairs, front marked on each side with a white spot, face produced into a very long and sharp cone, the lateral line of the thorax, the margin of the abdomen, and three pairs of spots white, legs whitish, basal half of the femora black. Length of body 1½ lines (3 mm.), length of wing same.

Black, shining, clothed with short and fine white hair. Head concolorous, front marked on each side with a white dot, face produced into a very long and sharp cone, often fuscous above. Antennae black, the first two joints fuscous, rarely yellowish. A humeral spot and a very slender lateral line on the thorax white. Margin of the abdomen white, the second, third, and fourth segments each marked with two long white spots contiguous on the hind margin. Venter often white, sometimes the lateral border and the last segments wholly brown or blackish. Legs whitish, the femora often black except the tip, sometimes also at the base dull whitish, posterior tibiae except the base and tip frequently darkened. Wings whitish, the stronger veins pale yellowish. (*Translation.*)

Cuba, Gundlach. (1)

16. NEMOTELUS IMMACULATUS Johnson.

Nemotelus immaculatus Johnson, Proc. acad. nat. sci. Phila., 1895, p. 304. (1)

Male. Face and vertical triangle blackish; eyes of a dull brown color (probably much lighter than in the living specimen); antennae yellow; proboscis red, unusually long, with an acute angle, the two portions thus formed being of almost equal length, the outer half is curved downward and the basal part of the other is somewhat enlarged. Thorax black, with sparse whitish pubescence most prominent on the pleurae; scutellum black; abdomen greenish white, immaculate. Legs light yellow; wings hyaline, whitish.

Length 4 mm.

St. Augustine, Florida (F. H. Genung). (1)

17. NEMOTELUS ALBIROSTRIS Macquart.

Nemotelus albirostris Macquart, Dipt. exot. Suppl. 4, p. 359; Tab. 3, fig. 8. (1)

Male. Thorax black; abdomen white.

Rostellum a little longer and more drawn out than in *N. pantherinus;* white above, black beneath; proboscis slender and elongate. Front linear. Antennae inserted at the base of the rostellum, yellow, the end of the third joint brown. Thorax black with a green reflection. Abdomen white. Femora black the tip white; tibiae and tarsi white. Halteres white. Wings hyaline. (*Translation.*)

1½ lines (3 mm.).

Virginia (M. Bigot). (1)

The "linear front" probably means that the eyes are subcontiguous as in the males of some of the other species.

Profile of head, redrawn from Macquart's illustration, figured on plate.

18. NEMOTELUS WHEELERI, sp. nov.

Male. Head comparatively flattened; rostellum slender, long, yellowish above; antennae fuscous, style slender; two triangular contiguous yellow spots in the frontal triangle; eyes contiguous, not depressed medially, the lower facets small; proboscis twice the length of the head, slender, chitinous, reflexed, geniculate at the basal third. Thorax black, subshining beneath, with short appressed yellow scaly pubescence; humeri and a narrow lateral line pale yellow; pleurae similar; halteres white. Abdomen flat, white over all. Basal three fourths of the femora black merging into the white knees, remainder of legs yellowish. Wings and veins hyaline, third vein furcate, fourth posterior arising near middle of underside of discal cell.

Female. This sex differs from the male as follows: head conical, one half longer than high, occiput flattened; the broad front minutely scabrous, with two rounded spots at the margin of the eye. Abdomen black, except for a paired medial series of transversely elliptical yellowish spots on the posterior margin of the first four segments, the last pair connected with the yellow margin circumscribing the entire abdomen; genitalia yellow; venter blackish, margined with yellow.

Length 4–5 mm.

This pretty little species was secured during the first weeks of June, 1900, at Galveston, Texas, being attracted to an undetermined Composite growing profusely near the Medical college of the University of Texas. It gives me much pleasure to dedicate this to my instructor, Dr. William Morton Wheeler, who assisted in the capture of these specimens.

Profile of head of male and female figured on plate.

19. NEMOTELUS BELLULUS, sp. nov.

Male. Head globose; rostellum short, black; antennae black, style slender; frontal triangle yellow; eyes contiguous and slightly depressed along their line of meeting, the lower facets not much smaller; proboscis slender, reflexed, chitinous, black, less than twice as long as the head, geniculate at the basal fourth, the outer part strongly curved. Thorax shining black, clothed with fine silvery pubescence; the large humeral spot and a narrow lateral line whitish; pleurae more sparsely pubescent. Abdomen entirely white. Femora black on basal three-fourths, the knees whitish; tibiae black except tips; tarsi yellowish. Halteres white. Wings and veins hyaline, the costal veins, however, yellow, third vein furcate, fourth posterior vein arising near middle of underside of discal cell.

Female differs from the male in the shape of the head and coloration of the abdomen. Head roundedly conical, in profile slightly excavated above; the frontal white spots transversely lengthened. Thoracic pubescence not so fine. Abdomen black with a double series of narrow transverse yellow spots on the posterior margin of the first four segments; the side margin of the first six segments very narrowly yellowish, terminal segments infuscated; venter black, the posterior and side margins of the individual segments very narrowly yellowish.

Length 3–4 mm.

Described from a number of specimens collected at Galveston, Texas, June, 1900.

Profile of head of male and female figured on plate.

HULL ZOOLOGICAL LABORATORY,
University of Chicago.

DESCRIPTIONS OF THREE NEW DIPTERA OF THE GENUS PHTHIRIA.

BY CHARLES W. JOHNSON, BOSTON, MASS.

PHTHIRIA CYANOCEPS, sp. nov.

♂ Front, face, and occiput light bluish gray, ocellar triangle black; first and second joints of the antennae light yellow, third joint black, and about twice the length of the first and second joints combined; proboscis black, nearly double the length of the head. Thorax bluish gray (becoming blackish when dampened); scutellum light yellow. First and second segments of the abdomen black, with a sharply defined, narrow, posterior margin of yellow on the first segment; posterior margin of the second and all of the remaining segments, widely margined with grayish white, leaving a narrow, blackish, basal band, the segments are often so contrasted in dried specimens that the dark anterior portion is more or less concealed. Halteres white. Legs light yellow, tip of the metatarsi and all the other joints of the tarsi black. Wings whitish hyaline.

♀ Front and vertex broad, yellowish, occiput more prominent than in the male; ocelli, a small spot above the base of the antennae, and a short line on the occiput extending toward the cervix, on each side of a median depression, black, the first abdominal segment black, the others brownish, and all widely margined posteriorly with yellow. Length, 1.5 mm.

Four males and one female were collected by Mr. Owen Bryant and myself, on September 8th, by sweeping over the scanty vegetation on a white sandy tract near the beach at Cohasset, Mass. The eyes are a brilliant blue when living, changing to purple after death, and to dark brown when dry. It is the smallest of our described species. Types in the New England collection of the Boston society of natural history.

PHTHIRIA ALDRICHI, sp. nov.

♂ Face, ocellar triangle, and occiput grayish white, frontal triangle yellowish; face and occiput bearing conspicuous white pile; first and second joints of the antennae yellow, third black and about double the length of the other two; proboscis black and more than twice the length of the head. Thorax grayish white, sparsely covered with whitish hairs (in damp or greasy specimens the thorax is black); scutellum, postalar processes, and a spot between the base of the wing and halteres yellow. Abdominal segments blackish widely margined posteriorly with yellow, the black being most prominent on the second segment, genitalia and venter yellow. Legs variable in color, usually brownish black, with the base and tip of the femora and the base of the tibiae and metatarsi more or less yellowish. Halteres white, wings whitish hyaline.

♀ Front and face yellow, cellar triangle and a short line on the occiput, on each side of the median depression, black. Humeri, lateral margins, upper portion of the pleurae, postalar

ADDITIONAL NOTE ON NEMOTELUS.

BY A. L. MELANDER, PULLMAN, WASH.

It not infrequently happens that two entomologists publish independently on a certain subject. When the same species are simultaneously described in different journals there may be considerable doubt as to which name shall be used as it is often difficult to determine the exact date of publication of the descriptions.

In this way Dr. C. F. Adams and myself chanced to describe several species of the dipterous genus *Nemotelus*, Dr. Adams' paper appearing in the Kansas University Science Bulletin for November, 1905, page 221, and mine in PSYCHE in the number for October–December, 1903, pages 171–183. The two species described by Dr. Adams, *kansensis* and *abdominalis*, when judged by their descriptions certainly seem identical with two species described by me, *bellulus* and *trinotatus*.

Through the kindness of Dr. Adams I have secured typical specimens of his species and find characters not mentioned in the diagnoses by which the species can be separated. For the convenience of the future student these are given herewith.

Nemotelus abdominalis Adams.

Female: rostellum more elongate and conical than in *bellulus*, extending beyond the base of the antennae two-thirds their length. Abdominal marks extending half way into the segments. The pale fasciae of the abdomen are of the paired type mentioned in my analytical key, but are subconfluent medially and thus present the appearance of a transverse band. Length 4 mm.

Male: Rostellum projecting two-thirds the distance to the tip of the antennae: eyes contiguous for less than half their diameter, and evidently impressed along their line of contiguity: front tibiae with a narrow dark ring in the middle.

Nemotelus bellulus Melander.

Female: Rostellum shorter, beak-like, *i. e.*, bent downward at tip, reaching about half way to the end of the antennae: pale marks of abdomen marginal. Length 3–4 mm.

Male: Rostellum very short: eyes contiguous about half their diameter, and less impressed, although more so than in *Wheeleri* Mel.: front tibiae with a suffused broad dark band.

The females of *kansensis* and *trinotatus* and markedly alike, but the males are entirely different. Dr. Adams suggested in a letter the possibility of a species with dimorphic males, but a close study reveals characters by which the females can be recognized, which indicates that there are two distinct species. The differences in the extent of the color markings of the abdomen and legs are not of value in separating these species. The characteristic differences between the two species may be stated thus:

Nemotelus kansensis Adams.

Female: 5.5 mm. Rostellum projecting beyond the eye more than the horizontal diameter of the eye: proboscis geniculate a little before the middle.

Nemotelus trinotatus Melander.

Female: Length 4.5 mm. Rostellum projecting not more than the diameter of the eye: proboscis geniculate at the middle.

The male of *kansensis* is at once distinguished from all the other species by the single conspicuous black fiscia on the fifth abdominal segment. *Slossonae* Johnson and *flavicornis* Johnson, the only other species with a black fascia so placed, are of small size and have the fourth segment also blackened. Moreover in these species the third vein is simple.

A Dipterous Parasite of the Box Turtle.— In Psyche, Vol. V, page 403, Dr. Wm. M. Wheeler mentions several cases of finding larvae of dipterous flies of the genus *Sarcophoga* in tumors in the skin of the Box Turtle. On July 28, 1902, I found another case of the same kind at Cold Spring Harbor, Long Island, N. Y., near the biological laboratory. The turtle had a swelling about an inch in diameter on the left side of the neck with a small opening directed forward that was usually nearly closed but could be easily stretched to quarter of an inch in diameter. Five larvae were taken out through this opening with forceps, one dead and partly decayed, the others alive and full grown. Placed in bottles with moist earth they buried themselves within a few hours. On July 31 one of them had pupated and the fly came out August 17. It is plainly a *Sarcophoga* but has not yet been examined by anyone familiar enough with this genus to determine the species. The fly and one of the larvae are in the Museum of Comparative Zoölogy in Cambridge, Mass.—*J. H. Emerton.*

From The Canadian Entomologist, Vol. XXXVI., 1904, pp. 14–24.

NOTES ON NORTH AMERICAN STRATIOMYIDÆ.

NOTES ON NORTH AMERICAN STRATIOMYIDÆ.

BY A. L. MELANDER, CHICAGO.

While arranging the flies of this family contained in the Garry de N. Hough collection of the University of Chicago, together with my own material, a number of notes have been made, which are here given. This family, like a number of other dipterous groups, needs monographic study owing to the confused and scattered descriptions of most of the forms. Of recent years the number of genera has been multiplied, although the authors have neglected to sift out the older species belonging to these new groups. Accordingly, the older genera, like *Sargus* for example, contain species of several of the modern subdivisions.

In the following pages are listed the species studied, together with the localities from which they were received. Analytical keys are introduced for several of the genera as an aid to the future student. I here wish to thank my friend, Mr. Charles T. Brues, for supplying descriptions not accessible in this city.

ALLOGNOSTA.

Our three species are related thus :

Discal cell not as broad as the stigma .... 2.

Discal cell as broad as the stigma ; abdomen testaceous centrally .... *fuscitarsis*, Say.

2. Abdomen testaceous centrally .... *similis*, Loew.
Abdomen wholly black .... *obscuriventris*, Loew.

A. fuscitarsis, Say.

Edgebrook and Algonquin, Ill.; Kiamesha, N. Y. June.

A. obscuriventris, Loew.

Edgebrook, Ill. June. This species occurs in company with the preceding in open woodland.

BERIS.

But two species occur in the United States. They have the thorax metallic green and the abdomen black.

Scutellum with four spines .... *viridis*, Say.
Scutellum with six or eight spines .... *Mexicana*, Bell., Will.

B. viridis, Say.

New Jersey (vi., 3, '01) ; Michigan ; Glen Ellyn, Ill. (v., 30, '99).

B. Mexicana, Bellardi, Williston.

One specimen from Vancouver Island (Livingston, vii., 14, '96) agrees with Dr. Williston's redescription of this species (CAN. ENT., 1885, p. 123).

SARGUS.

The species grouped under the old genus *Sargus* are many of them superficially described. Accordingly, it would be difficult to decide to which subdivision most of the species belong. So far the species described under the generic name *Sargus* may be distributed among the following groups :

Non-metallic species . . . . *Ptecticus*, Lw.*
More or less metallic species.
  Eyes contiguous or subcontiguous, ♂ ; ocelli equidistant.
    Abdomen long, pedicellate, cylindrical at the
      base . . . . *Macrosargus*, Bigot.
    Abdomen short, broad and
      flattened . . . . Spp. *elegans*, Lw., and *Texana*, sp. n.
  Eyes, ♂ ♀, separated ; front ocellus further from the other
      two . . . . *Sargus*, s. str.

The assignment of the species in the following table is based almost entirely on their descriptions, and hence can not be relied upon with absolute certainty. Many species are known from one sex alone, many are poorly described, and as we know that there is great variability in colour in some of the species, it seems certain that the species are less numerous than their descriptions. All the species that have been recorded as from North America are included in the table. To the future student who has a sufficiently large collection is left the task of solving the synonymy.

Abdomen petiolate ; eyes of male contiguous or nearly so ; ocelli equidistant (*Macrosargus*, Bigot) . . . . 2.
Abdomen not clavate ; eyes generally separated and front ocellus generally further from the others . . . . 11.
2. Thorax reddish, more or less metallic posteriorly . . . . 3.
   Thorax completely metallic green . . . . 4.
3. Abdomen dark green ; antennæ black . . . . *linearis*, Loew.
   Abdomen reddish, with four black fasciæ . . . . . *smaragdiferous*, Bigot.
4. Abdomen entirely metallic, cupreous . . . . 5.
   Abdomen with the second segment yellow . . . . . *coarctatus*, Macquart.
5. Scutellum margined with red; face more or less black pilose (*filiformis*, Gilio Tos) . . . . *cæsius*, Bellardi.
   Scutellum wholly green or gold-green . . . . 6.
6. Wings blackish . . . . *clavatus*, Walker.
   Wings at most brown . . . . 7.
7. Abdomen black with bronze lustre . . . . *clavis*, Williston.
   Abdomen cupreous with green lustre . . . . 8.
   Abdomen golden at base, aeneous at tip . . . . *aureus*, Bellardi.

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*(Of the species in Osten Sacken's Catalogue, *Sargus trivittatus*, Say, and *S. subinterruptus*, Bellardi, belong here.)

8. Pile black . . . . *alchidas*, Walker.

Pile fulvous . . . . 9.

9. Mesonotum with a white spot. . . sp. innom., Osten Sacken, Williston.

Mesonotum not marked with a white spot . . . . 10.

10. Pleura green ; vertical triangle longer . . . . *lucens*, Loew.

Pleura yellow ; vertical triangle shorter . . . . *lateralis*, Macquart.

11. Legs black, at least the hind femora more or less black . . . . 26.

Legs largely yellow ; at most the hind legs with brown markings . . 12.

12. Abdomen unicolored, not fasciate . . . . 13.

Abdomen purple with yellow fasciæ . . . . 25.

13. Abdomen reddish or yellowish, at least at base, sometimes with more or less cupreous tinge . . . . 14.

Abdomen black, green, violet, or cupreous, not light coloured . . . 17.

14. Pleura yellow, eyes of male contiguous . . . . *elegans*, Loew.

Pleura black or concolorous with the dorsum . . . . 15.

15. Face and front reddish yellow . . . . 16.

Face and front metallic green ; wings hyaline ; length 3 mm . . . . *bicolor*, Wiedemann.

16. Abdominal segments with lateral triangles ; wings light brown (not *pallipes*, Say) . . . . *pallipes*, Bigot.

Abdomen aeneous at the tip ; wings hyaline . . . . *debilis*, Walker.

17. Pleura yellow, wholly or partly . . . . 18.

Pleura black or dark metallic . . . . 20.

18. Legs varied with brown ; stigma blackish . . . . 19.

Legs completely yellow ; stigma fuscous . . . . *pleuriticus*, Loew.

19. Thoxax blue-green ; length 7 mm . . . . *cæruleifrons*, Johnson.

Thorax violet ; length about 16 mm . . . . *splendens*, Bigot.

20. Front testaceous ; scutellum margined with yellow . . . . 21.

Front metallic, except sometimes for two white spots . . . . 22.

21. Abdomen blue ; veins yellow . . . . *versicolor*, Bellardi.

Abdomen green ; veins dark . . . . *bagosus*, Walker.

22. Face yellow ; thorax violet . . . . *sapphireus*, Bigot.

Face black ; thorax green . . . . 23.

23. Eyes of male contiguous; ocelli equidistant; abdomen short and broad, green . . . . *Texanus*, sp. nov.

Normal *Sargus*-species ; abdomen slender . . . . 24.

24. *Sargus decorus*, Say.

abdomen green . . . . *punctifer*, Bigot.

abdomen cupreous .... *picticornis*, Bigot.
xanthopus, Wiedemann.
abdomen piceous .... *decorus*, Say.
25. Hind legs varied with brown .... *stamineus*, Fabricius.
Tip of hind tarsi only brown .... *tricolor*, Loew.
26. Thorax and abdomen violet green, concolorous .... 27.
Thorax violet or green, abdomen not concolorous .... 28.
Thorax red above, scutellum dark; abdomen yellow at base; fore legs pale .... *concinnus*, Osten Sacken.
27. Legs entirely black; antennæ black (*nigribarbis*, Bigot). *viridis*, Say.
Legs in part yellow; antennæ yellow ..... *nigrifemoratus*, Macquart.
28. Wings with a brown cloud at middle (*nubeculosus*, Zetterstedt) .... *cuprarius*, Linnæus.
Wings uniformly yellowish; front legs pale .... 29.
29. Abdomen uniformly metallic .... 30.
Abdomen with a white vitta .... *Sallei*, Bellardi.
30. Abdomen cupreous violet .... *speciosus*, Macquart.
Abdomen aeneous .... *latus*, Bellardi.

Of these species the following are not listed in Osten Sacken's Catalogue:

splendens, Bigot, Ann. Soc. Ent. France (5), ix., p. 224. 1879. Mex.
nigribarbis, Bigot, ibid., p. 224. Cal. (=*viridis*, Say.)
clavis, Williston, CAN. ENT., xvii., p. 123. 1885. Va., N. C.
punctifer, Bigot, Ann. Soc. Ent. France (6), vii., p. 27. 1887. Col.
picticornis, Bigot, ibid., p. 27. Wash.
pallipes, Bigot, ibid., p. 28, Oregon.
sapphireus, Bigot, ibid., p. 28, Cuba.
concinnus, Osten Sacken, Biologia Centr.-Amer. Dipt.
sp. innominata, Osten Sacken, ibid., p. 23. Mex.
Williston, ibid., Suppl., p. 231.
filiformis, Gilio Tos, Bull. Mus. Zool. Torin. 1891, No. 102. Mex. (=*cæsius*, Bell.)
sp. innominata, Townsend, Ann. N. Hist., xix., p. 18. 1897. Mex.
cæsius, Bellardi, Williston, Biol. Centr.-Amer. Dipt. Suppl., p. 232.
cæruleifrons, Johnson, Ent. News, Phila., xi., p. 325. New Jersey.
cuprarius, Linn, etc. A common European species.
coarctatus, Macq., etc. A Brazilian species, taken also in Mexico.
Texanus, sp., nov. Described herewith.

Notes on the distribution of the specimens of *Sargus* studied.

1. *lucens*, Loew. Several specimens from Hayti.

2. *cuprarius*, Linn. This is the species known as *nebeculosus*, Zett., in collections. Not rare. Woods Hole, Mass. (July); Newark, N. J. (June); Penn.; Chicago, Ill. (June-July).
3. *decorus*, Say. Kiamesha, N. Y. (June); New Bedford, Mass. (May); Phila., Penn.; Ontario; Algonquin and Chicago, Ill.; Austin, Tex.; Vancouver Island. June and July.
4. *viridis*, Say. Mich.; London, Ontario; Chicago, Ill.; Denver, Col. May and June.
5. *elegans*, Loew. Opelousas, La. May and June.
6. *Texanus*, sp. nov.

Male: Eyes contiguous, subcontiguous in front of the antennæ; front and face black; antennæ reddish, the style black; proboscis yellow; ocelli equidistant, ocellar triangle metallic black, with fulvous pile. Thorax polished green, scutellum and metathorax somewhat more bluish; pile of thorax fulvous, erect, appearing dense when viewed from the side; humeri and a line to the root of the wing yellow; pleura black. Abdomen metallic green, with erect fulvous pile, sexual organs testaceous; venter piceous, becoming metallic posteriorly. Legs, including coxæ, completely yellow. Halteres yellow. Wings lutescent, veins yellow. Length, 6 mm.

Female: Front and vertex green, their sides parallel, medially bisected by a fine impressed line, which also separates the transversely lunate frontal white spots. Between the antennæ and the frontal marks the ground colour is piceous. Otherwise as in the male.

Described from two males and one female collected by the writer at Austin, Texas, one bearing the date of April 28, 1900.

Although not a typical *Sargus*, this species is placed in this genus, as it is closely related to *elegans*, Loew. From *elegans* it may be distinguished by the shorter contiguity of the male eyes (in *elegans* the eyes are contiguous up to the ocellar triangle), by the lack of frontal spots in the male, the wholly green thorax and the black pleura.

PTECTICUS.

The two species occurring in the United States may be separated as follows:

Front black above; hind metatarsi black, remainder of hind tarsi white.................................... *Sackenii*, Williston.
Front wholly yellow; hind tarsi brown................*trivittatus*, Say.

P. trivittatus, Say. (*P. similis*, Will.).

A single female from Pennsylvania.

Hermetia.

1. *H. illucens*, Linn.

Not rare at Austin, Texas, during the whole year. The species seems to have a predilection for fences and sidewalks, where they can be picked up with the fingers, showing no desire for flight.

2. *H. aurata*, Bellardi.

Austin, Texas. April-May.

Oxycera.

1. *O. maculata*, Oliv.

Opelousas, La. (May-June); Toronto, Ontario.

2. *O. unifasciata*, Loew.

Boykins, Va. (June); McHenry, Ill.

Euparyphus.

E. tetraspilus, Loew.

McHenry, Ill. June.

Nemotelus.

The genus *Nemotelus* has been reviewed in the current number of Psyche, where five new species are described from my collection.

Myxosargus.

M. fasciatus, Brauer.

Several specimens, all males, of this dainty little species were taken running about on the large leaves of Elephant's-ear growing along the Comal River, New Braunfels, Texas. May.

Stratiomyia.

Owing to the absence in Florida of Mr. C. W. Johnson at the time of publication, the analytical keys of *Odontomyia* and *Stratiomyia* in the Trans. Am. Ent. Soc. (1895) are full of typographical errors. Every student of this paper has been perplexed as to the meaning of the strange mélange. The following table is a transcription of the key published on page 230 of Mr. Johnson's paper:

Head ♂ ♀ narrower than the thorax .... 2.
Head ♂ ♀ much wider than the thorax; third antennal joint flat .... 17.
2. Eyes ♂ ♀ glabrous .... 3.
Eyes ♂ pubescent .... 16.
3. Occiput of both sexes largely yellow .... 4.
Occiput black, sometimes yellow beneath .... 8.
4. Antennæ normally long .... 5.
Antennæ noticeably shorter than in the other species .... 7.

5. Abdominal spots usually connected on the fourth segment of the male, and always connected on the fourth and usually on the third of the female ....6.
Abdominal spots never connected on the fourth segment of the ♂, and rarely connected in the ♀ ....*barbata*, Loew.

6. Fifth segment with a large keystone-shaped marking.*melanostoma*, Lw.
Fifth segment with a dorsal line and spot at the anterior angle ....*lativentris*, Lw.

7. Abdomen: lateral triangular markings on the second and third segments, widely connected on the lateral margin...*Bruneri*, Johns.
Abdomen: lateral subtriangular markings on the second and third segments not connected at the lateral margins ......*laticeps*, Lw.

8. Scutellum normally yellow, or with base narrowly black..........9.
Scutellum black, or with narrow apical margin yellow.... ......12.

9. Second segment with lateral triangles; wings infumated .... 10.
Second segment with narrow lateral markings; wings usually dark .... *senaria*, Lw.

10. Posterior margin of fourth segment yellow, with median triangular projection..................................*unilimbata*, Lw.
Yellow on posterior margin of fourth segment interrupted........11.

11. Fourth segment with a small dorsal triangle; vertex of ♀ black....................................*normula*, Lw.
Fourth and fifth segments with small dorsal triangles; vertex of ♀ usually yellow... ....*norma*, Wied.

12. Abdomen with yellow markings......... ....13.
Abdomen wholly black ♂ (♀ unknown) ....*Nevadæ*, Big.

13. Abdominal markings linear.......................... ....14.
Abdominal markings coalesced, forming a triangular yellow spot at the anterior corners of the abdomen ....15.

14. Fifth segment with a dorsal line; lateral markings on the segments of the ♀ very narrow.. ....*Meigenii*, Wied.
Fifth segment with a dorsal triangle; lateral markings on the segments of the ♂ ♀ prominent ....*apicula*, Lw.

15. Pile of the thorax unusually long and dense; abdomen wide, third and fourth segments very convex.............. ......*discalis*, Lw.
Pile on the thorax normal; abdomen narrow, and third and fourth segments noticeably convex ....*quaternaria*, Lw.

16. Face of ♀ yellow, ♂ black; abdomen with a wide maculated or indented lateral margin; variable................*maculosa*, Lw.

Face of ♂ ♀ yellow, with a longitudinal line of black; abdominal markings transverse, the same in both sexes; eyes of ♀ glabrous................................*badius*, Walker.

17. Abdomen: bands on the second segment interrupted, the third and fourth contiguous.......................................18.

Abdomen: fourth and fifth segments only with wide yellow bands ....*mutabilis*, Fabr.

18. Scutellum ♂ black ....19.

Scutellum ♂ ♀ yellow............................*constans*, Lw.

19. Abdomen: bands on the second and third segments contiguous ....*Gerstæckeri*, Bell.

Abdomen: second segment with two large spots ...*bimaculata*, Bell.

List of species of *Stratiomyia* studied.

1. *S. melanostoma*, Lw.
McHenry, Ill. July.

2. *S. lativentris*, Loew.
Chicago, Ill. (July); Canada.

3. *S. normula*, Loew.
Chicago, Ill. (May); Colorado.

4. *S. norma*, Wiedemann.
Indiana; McHenry, Ill. (June).

5. *S. unilimbata*, Loew.
McHenry, Ill. (July); Milwaukee, Wisc. (June); Berkeley, Col. (May).

6. *S. Meigenii*, Wiedemann.
Chicago, Ill.; Austin, Texas; S. Dakota.

7. *S. apicula*, Loew.
Algonquin, Ill. (June); Austin, Texas (April).

8. *S. discalis*, Loew.
Chicago, Ill. May.

9. *S. badius*, Walker.
McHenry, Ill. June and July.

10. *S. constans*, Loew.
Austin, Texas. April to October. Common.

ODONTOMYIA.

The puzzling key to the species of *Odontomyia*, given in the Transactions of the American Entomological Society, 1895, pp. 250–251, was printed without Mr. Johnson's supervision, and contains numerous mistakes in typography. The student attempting to use the key is misled to a blind ending in four places. The dichotomy is given corrected herewith. In addition to the species listed by Mr. Johnson, the Supplement of the Biologia Centrali-Americana contains three recent species from Mexico.

Third longitudinal vein branched........ ....2.
Third longitudinal vein simple ....13.
2. Abdomen largely green or yellow..............................3.
Abdomen largely black, the markings comparatively narrow .....10.
3. Sides of dorsulum of thorax yellow or green.......... ....4.
Dorsum of thorax wholly black...............................8.
4. Abdominal markings ♂ ♀ dissimilar; markings of ♂ confluent laterally ....5.
Abdominal markings ♂ ♀ similar, separated...................7.
5. Disc of thorax usually with two irregular marks ....*binotata*, Lw.
Disc of thorax without marks.................................6.
6. Spines of scutellum blunt ....*varipes*, Lw.
Spines of scutellum sharp......... ....*viridis*, Bell.
7. Abdominal markings triangular, attenuated and reaching the lateral margins ....*cincta*, Oliv.
Abdominal markings triangular, not reaching the lateral margins ....*dorsalis*, Fabr.
8. Abdomen ♀ with transverse bands; ♂ with only lateral markings at posterior angles ....*inæqualis*, Lw.
Abdomen ♀ with transverse bands; male with dorsal line........9.
Abdomen ♂ ♀ similar, with basal triangular spot and transverse bands....................................*rufipes*, Lw.
9. Scutellum and spines yellow .... *arcuata*, Lw.
Scutellum and spines black ....*flava*, Say.
10. Scutellum more or less yellowish, without spines ....11.
Scutellum black, with spines............ ....12.
11. Scutellum wholly black; black of the vertex does not extend over the vertical angle.............................*fallax*, Johns.
Scutellum, base black; black of the vertex extends over the vertical angle: proboscis longer..................*nigrirostris*, Lw.

12. Wings: very dark brown, face produced ....*nigerrima*, Lw.
Wings: veins reddish, face rounded, front broad ......*pilosus*, Day.
13. First antennal joint less than twice the length of the second ......14.
First antennal joint twice the length of the third or longer.......24.
14. Scutellum largely yellowish..............................15.
Scutellum black or marked with yellow.......................18.
15. Pleura ♂ yellow; thorax ♀ with yellow vittæ.... .*trivittata*, Say.
Pleura ♂ black; thorax ♀ not vittate......................16.
16. Abdomen wholly green........................*Aldrichii*, Johns.
Abdomen with black marks...............................17.
17. Antennæ, front and vertex red ....*hydroleonoides*, Johns.
Antennæ, front and vertex black..................*vertebrata*, Say.
18. Scutellum laterally green.....................*Texasiana*, Johns.
Scutellum apically green................................19.
19. Abdomen ♂ ♀ with wide dorsal line, usually narrower in ♂ than in ♀ ....20.
Abdomen ♀ black with transverse markings, ♂ with dorsal line.......................................*interrupta*, Oliv.
Abdomen ♂ ♀ with transverse or triangular markings...........23.
20. Third antennal joint sharply pointed; front yellow.............21.
Third antennal joint bluntly pointed; front shining black........22.
21. Abdomen brown-black, with wide continuous lateral margin; scutellum ♀ yellow.......................*microstoma*, Lw.
Abdomen with irregular median black stripe.........*pilimana*, Lw.
22. Pile of thorax whitish; median black stripe of abdomen straight...................................*Americana*, Day.
Pile of thorax yellow; median black stripe notched on the sides.......................................*virgo*, Wied.
23. Femora yellow; abdominal marks usually triangular..*pubescens*, Day.
Femora black; abdominal marks transverse.........*hoodiana*, Big.
24. First and second joints of the antennæ black..................25.
First and second joints red...................................26.
25. Front and vertex wide, lateral thoracic stripe continuous.............................*hieroglyphica*, Oliv.
Front and vertex narrow; lateral thoracic stripe abbreviated anteriorly...................................*similis*, Johns.
26. Eyes pubescent; scutellum of ♀ yellow......................27.
Eyes glabrous; scutellum black, with yellow margin.*occipitalis*, Johns.
27. Abdomen ♂ broad, with narrow markings, pilose..... *obscura*, Oliv.
Abdomen ♂ narrow, with wide markings, pubescent.*flavicornis*, Oliv.

(To be continued.)

NOTES ON NORTH AMERICAN STRATIOMYIDÆ.

BY A. L. MELANDER, CHICAGO.

(Continued from page 24.)

List of the species of *Odontomyia* studied.

1. *O. binotata*, Loew.
   Chicago, Ill. (July); Austin, Tex. (May); Colo.
2. *O. cincta*, Olivier.
   Chicago and Algonquin, Ill. (June).
3. *O. dorsalis*, Fabricius.
   Hayti.
4. *O. arcuata*, Loew.
   Chicago, Ill. (July); Colo.
5. *O. nigrirostris*, Loew.
   Chicago, Ill.; Austin, Tex.; Colo.; Lusk, Wyom. (August).
6. *O. nigerrima*, Loew.
   Chicago, Ill. (May).
7. *O. pilosus*, Day.
   Vancouver Isl. (June).
8. *O. trivittata*, Say.
   Chicago, Ill. (July); Mexico.
9. *O. vertebrata*, Say.
   Chicago, McHenry, Ill. (June, July).
10. *O. hydroleonoides*, Johnson.
    McHenry, Ill. (June).
11. *O. Aldrichi*, Johnson.
    Galveston, Tex. (June).
12. *O. virgo*, Wiedemann.
    Virginia; Maryland; Toronto, Ont.; McHenry, Ill. (June, July).
13. *O. pilimana*, Loew.
    McHenry, Chicago, Ill. (June, July).
14. *O. microstoma*, Loew.
    Woods Hole, Mass. (July).
15. *O. pubescens*, Day.
    Chicago, Ill. (May).
16. *O. interrupta*, Olivier.
    Chicago, McHenry, Ill. (May, July).
17. *O. hieroglyphica*, Oliv.
    Chicago, Ill. (August); Austin, Tex. (May).
18. *O. flavicornis*, Olivier.
    Austin, Tex. (April).

In addition to the species here mentioned, there are three undetermined specimens. One of these represents an undescribed genus, but is mutilated. The other two belong to *Cyphomyia*; of these one is from Austin, Texas, the only recorded instance of this genus being taken within the United States. As the descriptions of *Cyphomyia* are not accessible to me, these species must be omitted.

CATOCALÆ IN DR. HOLLAND'S MOTH BOOK.

BY G. H. FRENCH, CARBONDALE, ILL.

Within the last few years three books have taken their place in the scientific literature of this country that should make a great advance in the study of natural history in our high schools. The first was "The Butterfly Book," by Dr. W. J. Holland; the second, "The Insect Book," by Dr. L. O. Howard, and the third, recently out, "The Moth Book," by the author of the first. The cheapness of these three volumes places them within the means of any high school that makes any pretense to having a reference library, while the excellent plates, photographed from the specimens, make them of great value to the young who desire means for identifying their captives.

Without taking further space to speak of the general merits of "The Moth Book," I wish to point out a few errors in the names of the plates of Catocalæ. Plate 31, figure 14, is given as *C. obscura*, Strecker. This is evidently *C. residua*, Grote. The fringes of the hind wings of *C. obscura* are white, or white with only the fringe at the ends of the veins black. In *C. residua* there is only a very little white at the apex of the hind wings, as in this figure.

Plate 35, figure 13, is given as *C. Stretchii*, Behr. This is probably *C. Mariana*,, Hy. Edw. I have bred *C. Stretchii* from eggs, and find the fore wings quite variable within certain bounds, but in none of them is there the colouring of *C. Mariana*. The hind wings have two characteristic marks; the median band very narrow and terminating in a distinct hook, and a patch of red at the apex outside the black band, but inside the white fringe. Below the apex there are smaller red patches between the black veins. The fringes are white except where the black of the veins extends into the fringe.

I am glad to see *C. amasia*, A.-S., as figure 1, plate 35. I would have furnished Dr. Holland with a specimen of its companion, *C. Cordelia*, Hy. Edw., having the same range of locality, if I had known he desired it.

A SYNOPSIS OF THE SAPROMYZIDAE

By A. L. MELANDER

[Reprinted from Psyche, Vol. XX, No. 2.]

A SYNOPSIS OF THE SAPROMYZIDAE.[1]

By A. L. Melander,
Pullman, Washington.

In the Genera Insectorum, Fascicle 68 (1908), Friedrich Hendel has given an excellent review of the group Lauxaniinæ, generally known to American entomologists as the Sapromyzidæ. As this work has introduced several changes in nomenclature differing from the list of species as given in Aldrich's Catalogue, and as there has appeard no complete review of the North American species, the following synopsis is offered. It may seem presumptuous to publish this review, based as it is mainly on descriptions, for I have in all but eighty species of the family in my collection for reference, but the value of working tables in assisting future students is obvious enough to excuse its appearance in print.

Naturally, the attempt to visualize a species from a brief description alone does not assure the most satisfactory results, so that the following tables give largely an artificial classification. Such attempts at reconstructing a mind-picture of the species have proved especially unsatisfactory in the big group *Lauxania*, where the assignment of the species to *Minettia* or to *Sapromyza* has sometimes been merely a guess.

I am indebted to my colleague and neighbor, Professor J. M. Aldrich, for the inspiration that prompted this review and for his material assistance in sharing his library and collection during its progress. His collection has extended the distribution of many species, and in the following pages the localities of his species are added with the designation "Aldrich." Those localities marked with the asterisk (*) are represented in my collection.

The North American species of *Sapromyza* have been twice tabulated. In 1892 Mr. C. H. Tyler Townsend published a "Preliminary Grouping of *Sapromyza*" in the Canadian Entomologist, pages 301 to 304. The next year appeared "El Género *Sapro-*

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[1] Contribution from the Zoölogical Laboratory of the State College of Washington.

myza en América" by Felix Lynch Arribalzaga, in the Anales de la Sociedad Científica Argentina, xxxiv., pages 253 to 301.

The subgenus *Sapromyza* is our dominant group. The species may sometimes be difficult to place correctly in a tabulation since their yellow color may change at death. Where confusion was most obvious the species have been several times included in the key. Spottings of the abdominal segments may become vague through a darkening of the general color. Again, there is some variation in the extent of color markings; as, for example, *univittata*, *aveola*, and *vinnula*, probably varieties of a single species, show gradations in the extent of the mesonotal stripe, etc. *Flavipennis* Fabricius, with bare arista, is not the same species as *flavipennis* described by Wiedemann, although Wiedemann's specimens came from Fabricius' collection.

The following description of a new genus of Sciomyzidæ is included in this paper, since it deals with a species hitherto classed as a *Sapromyza*.

PŒCILOMYIA: A NEW GENUS OF SCIOMYZIDÆ. (Figs. 1 and 2.)

In a note in connection with the original description of *Sapromyza decora*, Loew stated that the shape of the head and particularly of the antennæ was very much like that of certain Tetanoceras, in view of which the species should be separated from *Sapromyza* as a distinct genus. Not recalling this note when studying specimens of *decora* I came independently to the same conclusion, and coincidentally received a letter from Mr. C. W. Johnson conveying the same suggestion.

Decora is an unusually distinct species, with its reticulate wings and maculate body. It clearly is not a Sapromyzine because of the following array of characters. These characters are invariably, or at least usually, associated with the Tetanocerine Sciomyzidæ and are not at all, or at most very rarely, found in the Sapromyzidæ.

Front broadly convex, the periorbits separated from the unusually broad, shining, central part by a strong suture; face strongly concave, the oral margin projecting, but the clypeus (Chitinhufeisen) rudimentary; cheeks nearly as deep as the eye-height; postvertical bristles divergent; second antennal joint elongate and bristly; the third joint triangular, pointed, excised above; palpi long and linear; thorax with a fine scabrous coating; prothoracic, mesopleural, and sterno-pleural bristles all wanting; front femora without a series of bristles on posterior flexor edge; middle tibiæ without preapical spur but with apical crown of bristles; wings with complete anal vein.

The species is therefore certainly to be excluded from the Sapromyzidæ, and as there is no genus in the Sciomyzidæ to receive it, I would propose for it the new generic name *Pœcilomyia*.

A further characterization presents the following:

Head in profile a little higher than broad, the upper portion spherical; periorbits less than one-fourth the width of the interfrontalia (Mittelleiste), separated from it by well-marked sutures which are parallel with the eye-margin on the front, but converge at the vertex to meet the sutures of the epicephalon (cerebrale) of the occiput. The interfrontalia is uniformly convex, glabrous, and highly polished, is darker than the silky periorbits, and is marked with a translucent median stripe extending forward from the anterior ocellus. The arms of the frontal suture (Stirnspaltenäste) continue weakly to the lower edge of the eye, but at the usual antennal dark spot they send a suture across to the eye thus dividing the frontal from the facial orbits (Wangendreieck). The lunula is completely covered. The face (Gesichtsleiste) narrow but widening below, at its middle no wider than the sides (Wangen), in profile considerably concave, with oral margin projecting. Clypeus (Schlundgerüst) entirely undeveloped. Palpi linear, porrect, extending beyond oral margin, hairy beneath. Cheeks (Backen) one-half the eye-height, hairy, rounding into the sides of the face (ohne Vibrisseneck). Paracephala (Hinterhauptsorbiten) loosely setose; a closely setulose patch above the neck. Eyes rounded, but obliquely longer than wide. First joint of antennæ small, nearly bare, immersed in its socket; second joint conical, with the upper inner side projecting most, the outer side about one-half the length of the third joint, the inner side subequal to this joint, setose, except the outside, and with three long bristles on the upper edge; third joint pointed, somewhat excised above, uniformly fine-hairy; the dark arista rather loosely and evenly plumose above and below; the whole antenna no longer than eye-breadth, with the arista shorter than the last two joints. The bristles of the head are long and strong and include: a pair of diverging postverticals, a convergent inner and a divergent outer vertical, 2 reclinate fronto-orbitals and a stout pair of proclinate ocellar bristles. The lesser ocellars are very small. The orbital bristles arise from dark-colored papillæ. The chætotaxy of the thorax is as follows: 1 humeral, 0 posthumeral, 2 notopleural, 1 presutural, 3 dorsocentral, 1 pair prescutellar, 2 pair convergent scutellar, 1 supraalar, and 2 approximate postalar bristles; no prothoracic or pleural bristles, except a couple (Vallarborsten) on the pteropleural ridge just under the calypter. Meso-, ptero-, and sternopleuræ with scattered fine hairs, the last with a bristle in the angle below. Calypteres pale yellow, with pale fringe. Front femora with several bristles in extensor row, hind femora ♂ biseriately spinose beneath; front and hind tibiæ with preapical bristle, middle tibiæ with usual ending of bristles. Last two segments of abdomen with long submarginal bristles; hypopygium globose. Wings reticulate with alternating light and dark spots, costal margin unbroken; first vein ending midway between tip of auxiliary vein and the anterior cross vein; veins not sinuate, third and fourth veins subparallel; anal vein complete.

Type: *Sapromyza decora* Loew.

Of the eighteen genera of Sciomyzidæ before me the new genus bears most resemblance to *Trypetoptera* Hendel, but presents these differences: first vein ending far before the anterior cross vein; meso- and pteropleuræ with very fine hairs which are scarcely bristle-like; second antennal joint obconical and not rounded; calypteres pale; fronto-orbital sutures distinct, in *Trypetoptera* the periorbits are not differentiated; three dorsocentral bristles.

None of the other genera, except *Coremacera* Rondani, have the periorbits so definitely separated from the interfrontalia. The presence of three dorsocentrals and of a convex and broad middle portion of the front are unusual characters in the Sciomyzidæ.

Table of Genera.

1. Tibiae with evident preapical bristle; two fronto-orbital bristles; postvertical bristles convergent; ovipositor not specialized, with two small lamellæ (Subfamily Lauxaniinæ) 2
   Tibiæ without preapical bristle; front with only the upper orbital bristle; postvertical bristles divergent; ovipositor flattened, with chitinous tube-like ending (Subfamily Lonchæinæ) 13
2. Face swollen, in profile convex 3
   Face flat, without convexity in the middle, in profile a straight line 7
3. Third anntenal joint greatly lengthened, pointed or slender and linear 4
   Third antennal joint shortened and oval, first joint shorter than second 6
4. Two sternopleural bristles; both fronto-orbital bristles reclinate; face not strongly gibbous. (Fig. 10.) . . . . **Lauxania** Latreille.
   One sternopleural; anterior pair of fronto-orbitals convergent; face markedly gibbous 5
5. Head higher than long, occiput and front concave; the line connecting the fronto-orbitals converging in front, lower orbital bristle strongly inclined; facial groove nearly touching lower angle of eye, extending back under the eye so that the face is strongly developed underneath as well as in front; ocelli not elevated. (Fig. 6.) . . . . **Physogenia** Macquart.
   Head more globular, the front convex; fronto-orbital bristles in parallel rows; facial groove parallel with margin of eye, continuing obliquely downward leaving the cheeks free, the face in front of and not beneath this line; ocellar triangle somewhat raised. (Fig. 7.) . . . . **Pachycerina** Macquart.
6. Face with a transverse groove above the mouth, or with lateral vestiges of a groove, the oral margin projecting more or less in front of this groove; arista sometimes pubescent. (Fig. 12.) . . . . **Caliope** Haliday.
   Face swollen, with or without a transverse groove above the mouth, but the oral margin retracted beneath or behind this groove; arista plumose. (Fig. 11.) . . . . **Xangelina** Walker.
7. In profile the angle formed by the front and face acute, less than 90 degrees; front less inclined than the face, so that the mouth opening is strongly retracted 8

Angle of front and face obtuse, the front more inclined than the face, the mouth opening therefore not retracted 9

8. Posterior cross-vein in middle of wing; third vein sinuous. (Fig. 4.) . . . . **Procrita** Hendel.

Posterior cross-vein beyond the middle of wing; third vein straight; eyes horizontally oval. (Fig. 8.) . . . . **Trigonometopus** Macquart.

9. Both fronto-orbital bristles reclinate 10

Anterior pair of fronto-orbitals extending inwards and forwards; 1 sternopleural; third joint of antennæ elongate. (Fig. 9.) . . . . **Camptoprosopella** Hendel.

10. Front forming no evident angle with the face; head higher than long; fourth vein bowed forward at tip of wing, narrowing the first posterior cell. (Fig. 5.) . . . . **Griphoneura** Schiner.

Front and face forming an evident though rounded and obtuse angle; head as long as high 11

11. Orbital bristles arising from tubercles; wings rather slender basally. (Fig. 3.) . . . . **Chætocœlia** Giglio-Tos.

Orbits without tubercles; wings not narrowed on basal half 12

12. Thorax opaque or sub-opaque, ground color usually dark, ocellar bristles usually large and spaced far apart near the front ocellus, behind the ocellars typically one or two pairs of outwardly diverging small bristles; arista usually plumose and at the same time the scutellar bristles usually cruciate; front often relatively broad; wings rarely pictured; hind tibiæ often marked with a basal ring. (Fig. 14.) . . . . **Minettia** Robineau-Desvoidy.

Thorax shining or but slightly pollinose, its ground color usually yellow; ocellar bristles usually small and placed close together behind the front ocellus, the other bristles rarely present; arista often pubescent and scutellar bristles generally parallel or diverging; convergent scutellar bristles typically not occurring with a plumose arista; front usually narrower; wings often pictured; hind tibiæ rarely annulate. (Fig. 13.) . . . . **Sapromyza** Fallen

13. Metallic black species; front rather narrow; two dorsocentral bristles. (Fig. 15.) . . . . **Lonchæa** Fallen.

Yellow, largely yellowish, or cinereous species, not metallic: front broad; four dorsocentrals. (Figs. 16–21.) . . . . **Palloptera** Fallen.

Lauxania Latreille, sensu lato.

Including *Lauxania* s. str., *Caliope* Haliday, *Xangelina* Walker, *Minettia* Robineau-Desvoidy, and *Sapromyza* Fallen.

1. Dorsum of thorax black or blackish in ground color, overlaid or not with pollinose coating; wings never pictured (except sometimes extreme base of cross-veins infuscated) 2

Mesonotum yellow, testaceous, reddish, or brown, not black in ground color, except rarely a median dark vitta; wings often pictured 45

2. Third antennal joint linear, elongate, cylindrical, the first joint as long as or longer than the second; center of face protuberant; facial orbits white pruinose (*Lauxania* sensu stricto) 3

Third antennal joint ovate or oblong-ovate, not more than four times as long as broad, the first joint shorter than the second; center of face gibbose (*Caliope* and *Xangelina*) or not (*Sapromyza* and *Minettia*)..............10

3. Wings short and broad, brown; second vein arched forward; scutellum long and flat; four rows of acrostichals, the middle rows very indefinate; arista plumose. (N. J.; Fla., Aldrich; Ga.*).............**Lauxania latipennis** Coquillett.

Wings not abnormally broad and short, the submarginal cell not broadened at the expense of the marginal; scutellum shorter........................4

4. Knob of halteres black; calypteres and fringe dark; base of wings darker than remainder; arista short-plumose; front legs black, the posterior tibiæ and tarsi brown..5

Halteres yellow or white; calypteres rarely dark; wings not blackened at base; arista white..7

5. Scutellum convex; body and head polished; periorbits broad, cœruleous, the median vitta of front shining black. Eur.*, N. Scot., Mass.*, N. Y.*, (N. J., Pa., Mich., Wisc. Aldrich), Ga., N. Mex., Queb.*, Ont.*, B. C,*, Alaska*. (Fig. 10.)..................**Lauxania cylindricornis** Fabricius.

Scutellum flat, white pollinose; mesonotum white pollinose except a narrow median stripe and the sides broadly; pleuræ with two white pollinose spots..6

6. Face completely white pollinose; front opaque with the sides white pollinose, a lateral vitta cinereous and the median vitta black; arista dark except base. Fla., N. J...................................**Lauxania opaca** Loew.

Face with a middle line and lateral vittæ more or less white-pollinose, otherwise shining; front shining black except the narrow orbits, but viewed from above showing a black median vitta and lateral black spots circumscribed with white pollen; arista pale. (*facialis* Coquillett) Fla., Ga.*, La.*; Tenn. Aldrich...................................**Lauxania trivittata** Loew.

7. Arista densely pubescent with appressed white hairs; front shining black.....8

Arista loosely plumose; center of front opaque black; legs largely whitish.....9

8. Mesonotum and scutellum whitish pruinose; front tibiæ and tarsi black; front femora and posterior legs brownish; lunule red; 3 dorsocentrals, 4 acrostichal rows. Ariz.; Mono Lake, Cal. Aldrich.
...................................**Lauxania nigrimanus** Coquillett.

Head, thorax and abdomen shining, with slight coppery tinge; legs brownish but the posterior femora largely black; 4 dorsocentrals, 2 acrostichal rows. Cal.*...................................**Lauxania albiseta** Coquillett.

9. Scutellum velvety black except at base; legs whitish, the coxæ and femora black; wings yellowish. N. J., Pa., Ga.; Kans., Tenn. Aldrich.
....**Lauxania femoralis** Loew.

Scutellum shining, lightly white pollinose; front legs ♂ black from end of femora to tip of metatarsi, remainder of front tarsi white; costal part of wings yellowish, apex and posterior part infuscated. Pa.
....**Lauxania manuleata** Loew.

10. Face more or less protuberant in center, in part at least polished, although sometimes with oral, orbital or subantennal pruinose markings; halteres yellow..11

Face flat or concave, wholly silvery, white, yellow or gray pruinose, or otherwise marked with pollen, not polished; halteres sometimes black..........24

11. Antennal arista bare or microscopically pubescent; wings nearly hyaline.....12
Antennal arista moderately or long plumose, or with dense pubescence; front not yellow, except sometimes a spot on lunule; wings yellowish............16

12. Front not vittate; insect entirely black, except halteres and wings. Cal.* ....**Caliope nigerrima** sp. nov.
Front vittate with reddish...13

13. Head largely yellow or red...14
Head black, the front anteriorly and the face in part yellowish..............15

14. Very robust, cheeks broad; head reddish except for an occipital fascia, three frontal vittæ, the middle one triangular, and six facial spots; scutellum and base of abdomen reddish; legs reddish, femora in part black; thorax pollinose; third antennal joint elongate; 3 dorsocentrals, 2 sternopleurals; scutellars strongly diverging. Tex.; Miss. Aldrich.....**Minettia eucephala** Loew.
Head yellow, the ocellar region and short lateral vittæ black; third antennal joint ovate; legs blackish, the knees and end of tibiæ tipped with yellow; thorax shining. D. C.........................**Caliope flaviceps** Loew.

15. Third antennal joint less than twice as long as wide; legs yellow except base of femora; 4 dorsocentrals. Tex.*, Ariz..........**Caliope variceps** Coquillett.
Third antennal joint over three times as long as wide; legs black, the knees and posterior tibiæ and tarsi yellow; 3 dorsocentrals. Ariz., N. M. ....**Caliope longicornis** Coquillett.

16. Scutellum flat and velvety black; legs whitish, the femora black............17
Scutellum convex and not velvety..18

17. Scutellum entirely velutinous; center of front shining, laterally with a bisected dead-black spot. Tex.*; Kans. Aldrich.....**Caliope signatifrons** Coquillett.
Scutellum subshining at base; front opaque black above the antennæ, laterally shining; arista very long-plumose. Mass., Pa.*, N. J. (Fig. 12.) ....**Caliope gracilipes** Loew.

18. Front tibiæ largely blackish...19
Front legs including coxæ yellow; arista short-plumose, white, the base yellowish; face strongly gibbous. Cal.*............**Lauxania albiseta** Coquillett.

19. Thorax and scutellum white pruinose; front tibiæ and tarsi black, contrasting with remainder of legs; arista densely white-pilose. Ariz., Cal. ....**Lauxania nigrimanus** Coquillet.
Thorax and scutellum shining, not or scarcely pruinose; arista dark........20

20. Thorax with slight metallic tinge; pleuræ sometimes more or less brownish (compare species of alternate also)...................................21
Thorax polished black, but scarcely metallic..........................22

21. Thorax cæruleous, becoming reddish in back and on sides; pleuræ brownish; femora and tibiæ brownish, base of tarsi whitish. Mex., S. Am. ....**Caliope? flavipennis** Fabricius, Wiedemann,
Thorax chalybeous, pleuræ sometimes brownish in part; legs black, the tibiæ and tarsi yellow; 2 dorsocentrals, acrostichals numerous; third antennal joint oblate-ovate; face moderately convex. S. Am., Mex., W. Ind., Ala., La.*, N. J.; Orizaba, Aldrich..................**Caliope muscaria** Loew.

22. Face in profile incised at middle, bulbous only beneath antennæ; arista pilose.23
Face large, bare, smooth, evenly convex from side to side and from antennæ

to near the oral margin, just above the oral margin a narrow horizontal groove; arista plumose; deep shining black throughout, the third antennal joint and four posterior tarsi reddish. W. Ind., S. Am. (Fig. 11.) ....**Xangelina nigra** Williston.

23. Face glistening beneath the antennæ; third antennal joint four times as long as wide, dark; legs black, except knees and posterior tibiæ and tarsi. Eur., N. Scot., Wash.*......................................**Caliope elisæ** Meigen.

Face pollinose immediately beneath antennæ; third antennal joint three times as long as wide, often reddish; legs entirely yellowish. Cal., Vanc., Wash.*, Id.* (*livingstoni* Coquillett).............**Caliope quadrisetosa** Thomson.

24. Some of the abdominal segments marked with spots; thorax opaque gray pruinose..25

Abdomen not regularly spotted.......................................31

25. Arista long-plumose...26

Arista short-pubescent; mesonotum with four fuscous vittæ, scutellum with two fuscous dots; front bivittate; abdominal segments with four series of brown spots; legs yellow...30

26. Abdominal segments yellow, marked with pairs of blackish spots; thorax not vittate; scutellum cinereous black....................................27

Abdomen largely black..28

27. Lower part of pleuræ yellow; 2 dorsocentrals and 1 sternopleural. Kans. ....**Minettia crevecœuri** Coquillett.

Pleuræ concolorous with notum; 4 dorsocentrals and 2 sternopleurals. Md. ....**Minettia glauca** Coquillett.

28. Abdomen largely blackish, base and tip yellow, dull with thick cinereous coating; thorax uniformly cinereous, but humeri and scutellum yellow; 4 acrostichal rows; legs yellow; last sections of fourth vein subequal. Wash.* ....**Minettia univittata** var.

Abdomen polished; thorax vittate with brown; scutellum largely or wholly black...29

29. Abdomen black, base and tip yellow, each segment with lateral gray pruinose spots; legs whitish; thorax with four vittæ; face whitish; hind cross vein broadly brown; cross veins approximate. Nicaragua. ....**Minettia albipes** Coquillett.

Abdomen black with hind margins of segments brownish and pollinose, fifth segment with four gray pruinose spots; legs black except tibiæ and most of tarsi; thorax with three vittæ; cheeks with black spot. Nicaragua. (*varia* Coquillett.)................................**Minettia variata** Hendel.

30. Abdominal segments marked with four brown spots; femora not with patches of setulæ; antennæ often black at base; cheeks with large blackish spot; Pa., N. J., N. H., Can.; Tenn., Mich., Wisc. Aldrich. ....**Minettia quadrilineata** Loew,

Abdominal segments marked with many small brown setigerous spots; front femora with a row of minute setulæ on distal part of flexor surface; antennæ yellow. Me.*; Tenn., Wisc. Aldrich; Wash.*..**Minettia annulata** sp. nov.

31. Face silvery pollinose on a brown ground; thorax and abdomen shining bluish

black, the pleuræ brownish; femora blackish, tibiæ brownish, tarsi whitish. 5.3 mm. S. Am., W. Ind............**Minettia argyrostoma** Wiedemann.

Otherwise; if the face is silvery the thorax is pollinose....................32

32. Arista pubescent or bare...33

Arista plumose...36

33. Body very slender; black, thorax gray pruinose, legs brown, the posterior tibiæ and tarsi yellow; antennæ yellow, arista bare; wings four times the length of the abdomen. N. H., Alaska. ....**Minettia brachystoma** Coquillett.

Third antennal joint partly blackish, arista pubescent...................34

34. Mesonotum trivittate; front with median brown vitta...................35

Mesonotum and scutellum uniformly dusted; front shining black except a yellow anterior fascia, face silvery-dusted; legs blackish. Wash.* ....**Minettia nigrans** sp. nov.

35. Face silvery white; center of scutellum brownish; abdomen black; femora blackish, tibiæ brownish, their base yellow, tarsi more or less yellowish. St. Vincent..................................**Minettia exul** Williston.

Face with small brown spot each side of center; scutellum gray-pruinose; 3 dorsocentrals of which one is presutural, 2 acrostichals, 2 sternopleurals; venter yellow, dorsum of abdomen fuscous; base and middle ring of tibiæ yellow. 2.5 mm. Ga.; Tenn. Aldrich.......**Minettia vittigera** Coquillett.

36. Wings blackish at base; halteres black; thorax opaque black; abdomen black..37

Root of wing not blackened; halteres yellow; thorax grayish pollinose or subshining..38

37. Front less broad, face shorter and less convex, abdomen shining. Can., Pa., N. J., N. H..............................**Minettia obscura** Loew.

3 dorsocentrals, 6 rows acrostichals; abdomen subshining, grayish pollinose. Eur., Mass., N. J.*, Me.*, Pa.*, Que.*, Ont., Ill.*; Wisc., Mich. Aldrich. ....**Minettia longipennis** Fabricius.

38. Mesonotum very lightly gray pollinose, shining; 3 dorsocentrals, 4 acrostichals; head shining black. Eur., N. Am. (*frontalis* Loew). ....**Sapromyza hyalinata** Meigen.

Mesonotum and head opaque...39

39. Mesonotum opaque gray pollinose, with lateral margins brownish; strikingly marked with brown setigerous spots; 2 dorsocentrals, 1 sternopleural; scutellum gray pruinose; abdomen polished black, somewhat brassy. Fla., Cuba, Aldrich..................................**Minettia cineracea** Coquillett.

Mesonotum not marked with brown spots..............................40

40. Mesonotum vittate; abdomen largely or wholly black....................41

Mesonotum densely cinereous pruinose, not vittate......................42

41. Mesonotum blackish, almost opaque, with two narrow gray vittæ, scutellum black, abdomen reddish terminally; head yellow; legs light yellow. W. Ind. ....**Sapromyza puella** Williston.

Mesonotum opaque black, with four white-pollinose vittæ; scutellum black with white-pollinose margin; abdomen thinly gray-pollinose, shining at apex; head black. W. Ind.........................**Minettia albovittata** Loew.

42. Scutellum bordered with velvet black: palpi black; legs mostly yellow; 3 dorsocentrals, 4 acrostichals. Eur.*, Alaska, Que.*, B. C.*, Vanc,*. Mass.*, N. H., Vt.*, N. Y., N. J., Pa.*, Ill.*, Mont.*, Wyo.*, Id.*, Wash.*, (Mich., Wisc., Or., Tenn., Kans. Aldrich) (Fig. 14)...**Minettia lupulina** Fabricius.

Scutellum entirely gray-pollinose; palpi yellow............................43

43. Abdomen black, cinereous pruinose, base of segments 3, 4, 5, black-fasciate; head yellow, upper part of occiput and vertex black; legs mostly black. Nev.; Pine Lake, So. Cal. Aldrich; Wash.*......**Minettia cæsia** Coquillett.

At most a brownish fascia on those segments; head mostly black in ground color...44

44. Legs yellow, front of femora, a basal ring and apex of tibiæ sometimes darker; face yellowish with central U-shaped brown spot and facial grooves black. D. C.................................**Minettia magna** Coquillett.

Legs black; face uniformly overlaid with gray pollen. Mass.* ....**Minettia cana** sp. nov.

45. Species whose wings are marked or spotted in some way or other............46

Species with wings not at all ornate, except sometimes at very base, or with uniform infuscation..63

46. One or both cross-veins alone with brown clouding; usually 4 dorsocentrals...47

Costal margin before submarginal cell as well as one or both cross-veins brown; generally 3 dorsocentrals...51

2, 3 and 4 veins tipped with a brown dot, cross-veins clouded and third vein with one or two additional spots.................................61

With numerous confluent black dots and an apical spot surrounded by eleven dots; opaque gray spotted with brown on head, thorax and abdomen; legs yellowish, femora with two rings, tibiæ with one; halteres black. D. C., Tex. ....**Minettia stictica** Loew.

47. Arista long-plumose; thorax with four brown vittæ; face with black central spot; front with ocellar mark; base of antennæ black; abdominal segments trimaculate; hind tibiæ ringed. Nicaragua, Tex. ....**Sapromyza picticornis** Coquillett.

Arista short-plumose or pubescent; thorax yellowish; face and front uniformly yellow; antennæ yellow; abdomen not spotted; tibiæ not ringed..........48

48. Thorax opaque, dusted; 3 dorsocentrals, 6 uniform acrostichals; arista nearly bare; front longer than broad; hairs of lower facial ridge large; mesopleuræ setulose. Ill.*; Kans. Aldrich.................**Minettia ordinaria** sp. nov.

Thorax subshining; 4 dorsocentrals, 4 acrostichals, the middle rows setiform; mesopleuræ bare..49

49. Arista short-pubescent; front broader than long; brown of cross-veins suffused...50

Arista plumose; front longer than broad; clouds of cross-veins blackish; macrochætæ strong. Ill.*; Or. Aldrich..............**Minettia nubila** sp. nov.

50. Last ventral segment ♂ dilated or with two strong black teeth, lamellæ rounded and black-pilose; abdominal segments margined with long setæ; ocellar bristles closer together than width of front ocellus. Neb.; Mass.*, Vt.*, Ill.*, Ind.*, (Mich., Wisc., S. Dak., Kans. Aldrich) ....**Sapromyza bispina** Loew.

Abdomen not furnished with spines; entire insect yellow; ocellar bristles separated more than the width of the front ocellus; ♂ lamellæ long and linear Mex., N. J., B. C.*; Cal. Aldrich.......... **Sapromyza innuba** Giglio-Tos.

51. Mesonotum vittate; face maculate.................................52
Mesonotum not vittate; face not spotted...............................54

52. Mesonotum opaque yellow and with four vittæ; posterior tibiæ with basal ring; fifth vein not brown...53
Mesonotum brown and bivittate, pleuræ bivittate; tibiæ more or less brown but not ringed; fifth vein brown; face with two oral spots; abdomen testaceous; the last two segments with median vitta. S. Am., Mex. .... **Sapromyza geminata** Fabricius.

53. Face with a median oral spot; pleuræ bivittate; abdomen with three rows of brown spots; arista short plumose. W. Ind... **Minettia octovittata** Williston.
Face with black antennal spots and with a pair of dusky oral spots; pleuræ obsoletely maculate; abdomen reddish; arista short-pubescent; oral hairs more prominent than usual, the foremost almost bristle-like. Mass., D. C., N. J., Va., Fla., La.*......................... **Sapromyza umbrosa** Loew.

54. Scutellum with two black spots on margin; arista bare; abdomen with darkened incisures and median vitta. Mex., S. Am........ **Sapromyza bipunctata** Say.
Scutellum unicolorous; arista pubescent to plumose; abdomen yellow to brown but not marked..55

55. Brown of costal margin arising over posterior cross-vein and confluent with cloud on this cross-vein; ♂ lamellæ large, black-hairy; second joint of hind tarsi black, in ♂ broad; arista short-pubescent. Que., Ont., Me., N. H., N. J., Pacific Coast; Mass.*, Pa.*, Ill.*, Tex.* (Mich., Wis., Tenn., S. Dak. Aldrich)................................ **Sapromyza compedita** Loew.
Brown of costal margin arising near base of wing and usually separate from cloud on posterior cross vein; second joint of hind tarsi rarely differentiated from the others..56

56. Brown of costal margin including the anterior cross-vein..................57
Brown of costal margin separate from anterior cross-vein..................59

57. Brown of costal margin in addition to apical cloud extending backward as three broad blunt projections, the first including the anterior cross-vein, the other two not passing the third vein; arista plumose; abdomen brown. Brazil, Mex................................ **Sapromyza contigua** Fabricius.
Brown of costal margin with two rather slender projections in front of cross-veins in addition to the apical cloud; arista short-plumose; abdomen reddish 58

58. Costa broadly brown; second joint of hind tarsi not differentiated. N. Y. .... **Sapromyza sheldoni** Coquillett.
Brown of costa quite narrow at end of second vein; second joint of hind tarsi black, in ♂ somewhat widened. Mass.*..... **Sapromyza houghii** Coquillett.

59. Brown of costa stopping at fourth vein. S. Am., Mex. .... **Sapromyza latelimbata** Macquart.
Brown of costa extending beyond fourth vein at apex of wing..............60

60. Arista with scarcely perceptible pubescence. Ariz. ....**Sapromyza hubbardi** Coquillett.
Arista short-plumose. Mex.....................**Sapromyza stata** Giglio-Tos.

61. Third vein with a single spot near middle of last section; 4 dorsocentrals; arista short-plumose. Que., N. H., Mass.*, N. J., Pa.*, La.*, Ill.*; S. Dak. Aldrich.................................**Sapromyza philadelphica** Macquart.
Third vein with two spots near middle of last section......................62

62. Hind femora ♂ with black setulæ beneath; three dorsocentrals; arista long-plumose. Eur., N. H., N. Y....................**Sapromyza notata** Fallen.
Hind femora bare; four dorsocentrals; arista short-plumose. Pa., N. J., Cal.*, Wash.*...................................**Sapromyza fraterna** Loew.

63. Abdominal segments marked with regular series of spots, or vittate..........64
Abdomen not seriately maculate...77

64. Face with brown or black spot in middle above oral margin; ususally scutellum bimaculate also..65
Face yellowish, not spotted; usually the scutellum not maculate............68

65. Basal joints of antennæ black; pleuræ bimaculate; thorax with a narrow median vitta; 2 dorsocentrals, no acrostichals, one sternopleural; middle tibiæ without preapical bristle; segments 3, 4, 5 of abdomen bimaculate, a dorsal vitta on last three segments. Fla. ....**Sapromyza slossonæ** Coquillett.
Antennæ entirely yellowish; pleuræ not maculate.........................66

66. Thorax quadrivittate; hind tibiæ with basal ring; pleuræ bivittate; the flat disc of the scutellum with two indefinite broad brown marks; arista short-plumose; upper side of abdominal segments trimaculate; palpi black; 3 dorsocentrals, 6 acrostichals. Tex., W. Ind., Brazil, N. J.; Mass.*, La.*; Kans. Aldrich.......................................**Minettia macula** Loew.
Thorax not clearly vittate; tibiæ not ringed; pleuræ not vittate; scutellum bimaculate 67

67. Segments 2, 3, and 4 each with two spots, ♂ with median vitta on terminal segments also. W. Ind..............**Sapromyza octopunctata** Wiedemann.
Abdomen with series of median and lateral spots; arista short-pubescent. W. Ind..................................**Sapromyza ingrata** Williston.

68. Mesonotum vittate..69
Mesonotum not vittate; scutellum not maculate..........................72

69. Mesonotum with broad median vitta; palpi yellow; arista plumose; tibiæ not ringed; hind femora tipped with two small dark spots; abdominal spots not clearly defined, sometimes forming a basal fascia on the segments. Cal.* ....**Minettia univittata** Coquillett.
Mesonotum with lateral vittæ; palpi blackish; arista short-pubescent........70

70. Hind tibiæ with proximal ring; scutellum typically bimaculate; mesonotum quadrivittate; 4 dorsocentrals, 2 acrostichals, 2 sternopleurals; antennæ red; 71
Tibiæ not ringed; scutellum not maculate; notum shining, with three broad vittæ, the median geminate; third antennal joint black; abdominal segments more or less trimaculate. St. Vinc.........**Sapromyza venusta** Williston.

71. Abdominal segments with series of four fuscous spots; femora not with patch of setulæ. Pa., N. J., N. H., Montreal; Mich., Tenn., Wisc. Aldrich. ....**Minettia quadrilineata** Loew.

Abdominal segments with many small fuscous setigerous spots; front femora with a row of setulæ on distal part of flexor surface. Me.*, Wash.*; Wisc., Tenn. Aldrich.............................**Minettia annulata** sp. nov.

72. Abodminal segments fasciate, their marginal setæ strong..................73

Abdominal segments spotted..74

73. Abdomen brown with hind margins of the segments and a median vitta darker; palpi brown. Mex........................**Minettia vinnula** Giglio-Tos.

A basal or middle fascia on abdominal segments, basal segments more or less vittate; palpi red. Cal.*, Or.*, Wash.*......**Minettia flaveola** Coquillett.

74. Last two or three segments of abdomen with round black spot on each side; 1 dorsocentral, 6 acrostichals; palpi yellow. N. H., Alaska, Idaho*; Yukon Terr. Aldrich..........................**Sapromyza rotundicornis** Loew.

Abdomen with a median row of spots.................................75

75. Abdominal segments with median spots only..........................76

Last four segments of abdomen with both lateral and median spots; palpi yellow; mesonotum pruinose, scutellum shining. Nicaragua. ....**Sapromyza triseriata** Coquillett.

76. Mesonotum little shining; arista pubescent; wings gray hyaline, penultimate section of fourth vein but little more than one-half the ultimate; front narrow; palpi black at tip. W. Ind..............**Sapromyza sororia** Williston.

Mesonotum polished; arista plumose; wings yellowish, penultimate section of fourth vein about one-third the ultimate; face strongly convex; front broad. Fla...**Caliope lutea** Coquillett.

77. Mesonotum entirely yellow or reddish, not vittate with darker stripes.......78

Mesonotum vittate or blackish above.................................90

78. Scutellum with two black spots at the bristles; insect otherwise entirely luteous. S. Am., W. Ind............................**Sapromyza grata** Wiedemann

Scutellum not maculate..79

79. Scutellum black, with base brownish; pleuræ with brown mark before wing; abdomen black; arista long-plumose. Mex....**Sapromyza sonax** Giglio-Tos.

Scutellum and abdomen yellow..80

80. Face centrally marked with a velvet-black spot; front with a black ocellar spot; arista pubescent; notum thinly gray-pruinose, 3 dorsocentrals, 4 acrostichals; length 2.5 mm. N. H...................**Sapromyza puncticeps** Coquillett.

Face not maculate...81

81. Last ventral segment ♂ with lateral acute projections directed backward; arista short-pubescent...82

Abdomen not with such projections...................................83

82. The ventral spines very large, broad and conspicuous; ♂ lamellæ rounded, black-pilose. (*connexa* Say is probably the ♀) Mass. to Kans. ....**Sapromyza bispina** Loew.

The ventral spines slender; ♂ lamellæ minute, short black-pilose. Neb., Mex. ....**Sapromyza tenusipina** Loew.

83. Shining luteous species with black palpi and a black ocellar spot; mesonotum with two lighter vittæ. Ga., Fla., N. J., N. Y. ....**Sapromyza resinosa** Wiedemann.

Otherwise..84

84. Palpi brown; abdomen brown, the segments more or less fasciate on hind border and with long bristle-like hairs; front yellow. Mex. ....**Minettia vinnula** Giglio-Tos.

Palpi and abdomen yellow...85

85. Arista plumose; antennæ yellow.....................................86

Arista nearly bare; tip of antennæ blackened; ocellar bristles long; front broader than long; thorax at least subshining; scutellar bristles diverging..89

86. Thorax dull with yellow pruinosity; ocellar bristles and thoracic setulæ strong; 2 and 3 segments of abdomen with long bristles near hind margin, especially on sides; 3, rarely 4, dorsocentrals, 6 acrostichals......................87

Thorax shining; ocellar bristles rudimentary; front yellow.................88

87. Arista rather long-plumose; wings nearly hyaline; front with faint yellow fascia bordered with brown. Cal.*, Or.*, Wash.* ....**Minettia flaveola** Coquillett.

Arista short-plumose; wings strongly infumated; front not fasciate. Cal. Aldrich..................................**Minettia fumipennis** sp. nov.

88. Front as broad as long; arista long-plumose on upper side. Fla., Ga., W. Ind.*; Tenn. Aldrich..............**Sapromyza sordida** Wiedemann, Williston.

Front one-third broader than long; arista very long-plumose. Ga., La.* ....**Sapromyza amida** Walker.

89. Front with central black spot; 4 dorsocentrals; third antennal joint twice as long as deep, the upper side excised. Wyo.*.....**Sapromyza cyclops** sp. nov.

Front yellow; 3 dorsocentrals; third antennal joint short-ovate. Id.*, Wash.* (Fig. 13)..............................**Sapromyza monticola** sp. nov.

90. Mesonotum with narrow vittæ; front quadrate..........................91

Mesonotum with broad vittæ, or dark above.............................92

91. Arista plumose; thorax brownish, with two narrow grayish stripes; antennæ black; scutellum and base of abdomen black. W. Ind. ....**Sapromyza puella** Williston.

Arista pubescent; thorax reddish, with four slender brown stripes; antennæ red, tipped with brown. W. Ind...........**Sapromyza lineata** Williston.

92. Third antennal joint black; arista short-pubescent; palpi mostly black; thorax shining yellow with three broad brownish stripes, the middle one obsoletely geminate. W. Ind......................**Sapromyza venusta** Williston.

Antennæ yellow, the arista long-plumose; palpi yellow; thorax opaque, univittate or the disc dark..93

93. Mesonotum with a median broad dark stripe, at least the humeri yellow; hind femora tipped with minute shining black dot on each side; 3 or 4 dorsocentrals, 4 acrostichals; front yellow. Cal.* ....**Minettia univittata** Coquillett.

Disc of mesonotum dark; front brown on upper half......................94

94. Face with a U-shaped brown mark flanked by an oblique stripe; pleuræ not vittate; femora striped with gray in front, tibiæ with a basal ring. D.C. .... **Minettia magna** Coquillett.
Face yellow; pleuræ vittate above; legs yellow. Kans. .... **Minettia crevecœuri** Coquillett.

Caliope nigerrima sp. nov.

♂. Length 3 mm. Entirely black, the halteres, calypteres and wings alone yellowish. Front shining, with slight coppery hue, slightly broader than long, the ocellar bristles approximate: face in profile convex only near the antennæ, broadly angulate at the middle; center and sides of the face white-pruinose; lower occiput white-pruinose. Third antennal joint elongate-oval, twice as long as wide, the black arista microscopically pubescent. Palpi linear, black-hairy. Mesonotum shining greenish black, thinly coated with olivaceous pollen; four dorsocentrals, acrostichals very sparse, apical scutellars divergent, two sternopleurals. Abdomen shining, slightly metallic. Wings hyaline, with yellowish tinge, veins yellow, last two sections of the fourth vein nearly one to two.

A single specimen taken by Professor Aldrich at Pacific Grove, California, May 6, 1906.

The profile of the face indicates that this species is related to *quadrisetosa* and *elisæ*, but the uniformly black color and the subbare arista are different.

Caliope elisæ Meigen.

Meigen's original description calls for a species with white arista and red antennæ. Zetterstedt states that the arista is white and the tip of the antenna is brown. Schiner says that the infuscation of the antenna is variable and that the arista is light brown; while Rondani and Becker give the arista as brown.

This species was included in the North American fauna on Walker's authority. I have a series of specimens from Mount Constitution, on Orcas Island, Washington, that agree with the descriptions of *elisæ*, and may or may not be the same as the European species. In the absence of typical specimens of *elisæ* it would be premature either to describe them as new or to vouch their identity. They have the face but little bulbous beneath the antennæ and below the swelling it is excised in profile. This character is quite different from the evenly convex face of *cylindricornis*, with which species *elisæ* is repeatedly compared. The third antennal joint is dusky, four times as long as deep, its upper and lower edges parallel, so that before the tip it is not smaller than in the middle. The face is pollinose only along the orbits and not at all in the middle beneath the antennæ. The front legs are the darkest, their knees only are broadly yellowish.

Minettia nigrans sp. nov.

♀. Length 4 mm. Shining black, with pale wings. Occiput shining black; front one-fourth broader than long, shining black with bluish tinge, especially on the broad paraorbits, the front edge above the antennæ yellow, ocellar bristles moderate, rather distant; face not convex, uniformly white-pruinose; cheeks white-pruinose except the narrow shining oral margin; proboscis and palpi black. Thorax highly shining black, but the disc of the mesonotum dusted with gray, scutellum concolorous; three postsutural dorsocentrals, four rows of acrostichals, two sternopleurals; mesopleuræ with weak setulæ; scutellar bristles long, convergent. Abdomen shining black, the marginal setæ about two-thirds the length of the segments. Front legs entirely black, middle femora black except the knees, their tibiæ and tarsi blackish, hind femora black, the tibiæ and tarsi blackish, hind tibiæ without preapical bristle. Halteres white. Wings large, clear hyaline, veins pale, the last two sections of fourth vein proportioned two to five.

One specimen from Monroe, Washington; May 20, 1908.

Minettia cana sp. nov.

Like *lupulina* but the scutellum not bordered with black, palpi yellow, face uniformly gray-pruinose, and front lacking the conspicuous yellow fascia: like *glauca* but the abdominal segments not spotted and the front differently marked.

♀. Length 4 mm. Head and thorax black, thickly covered with blue-gray pollen. Middle of front with a broad brown fascia and orbits with a triangular brown spot at the level of the antennæ. Above the base of the antennæ the front shows but little trace of yellow ground-color, but is blue-gray pruinose like the face, vertex and occiput. Ocellar bristles distant, behind them are six cruciate setulæ. Antennæ reddish brown, the third joint ovate, with short-plumose brown arista. Palpi reddish yellow; proboscis black. Three dorsocentrals, four rows of acrostichals, the acrostichals and the other setulæ strong, metapleuræ setulose, two sternopleurals: mesonotum not vittate, scutellum uniformly cinereous above. Abdomen entirely yellowish, the segments not margined with long setæ. Legs blackish, the front legs black, front femora cinereous, knees narrowly yellowish, posterior tibiæ with base and a broad medial ring somewhat paler, hind tibiæ without preapical bristle. Halteres yellow. Wings uniformly with yellow tinge, as in *lupulina*; the last two sections of the fourth vein equal.

One specimen received with a lot of *lupulina* from Dr. Garry deN. Hough, who took it at New Bedford, Massachusetts, on Memorial Day, about twelve years ago.

Minettia annulata sp. nov.

♂ and ♀. Length 3 mm. Very close to *quadrilineata* Lw., in size, structure, chætotaxy, color, and variations in color, but distinguishable by its different sexual structures, the setulæ of the front femora, and the maculation of the abdomen.

Ground color mostly blackish, although sometimes quite testaceous, overlaid on head and thorax with dense cinereous pollen. Front large, a little broader than long, with two well-defined darker vittæ extending from the antennæ to the level of the posterior ocelli, elsewhere cinereous; ocellar bristles of moderate length and well separated from each other; face cinereous-white, the ground color beneath the antennæ sometimes more or less blackish, along the orbits whitish; below the eyes the cheeks are marked with a large darker spot. Antennæ yellowish, the third joint ovate; arista short-pubescent. Palpi black. Mesonotum blackish to testaceous, with alternating stripes, five cinereous and four fuscous, with four strong dorsocentral bristles, of which one is presutural, with but two definite rows of minute acrostichals, one intraalar; mesopleuræ with scattered short hairs; two sternopleural bristles: scutellum rather flat, cinereous except for the continuation on its disc of the median fuscous vittæ of the notum. Abdomen subshining, brownish to yellow, with numerous small brownish mottlings, most distinct at the bases of the submarginal rows of bristles, the mottlings toward the base of the segments sometimes confluent to form vague resemblances to the maculations of *quadrilineata*; hind margins of segments paler; marginal bristles nearly as long as the segments; hypopygium narrowly and deeply cleft, the two sides of the emargination sharply projecting ventrally as a pair of finger-like processes, ventrally at the base of the hypopygium there is another pair of black acuminate recurved processes. Femora brown to yellow but the underside of each with a well-defined dark spot near the distal third, the spot of the front pair provided in both sexes with a row of about ten microscopic close-set black teeth along the inner edge: tibiæ with basal dark ring opposite the femoral mark; tarsi dull yellowish. Halteres whitish. Wings uniformly subhyaline, the last two sections of the fourth vein proportioned three to five.

Nine specimens are before me from East Eddington, Maine (Hough), Price County, Wisconsin (C. F. Baker), Knoxville, Tennessee (Aldrich collection), and Mount Constitution, Washington, July 3, 1908.

Loew's species *quadrilineata*, well represented in Professor Aldrich's collection from Pennsylvania, Michigan, Tennessee, and Wisconsin, differs as follows: The stouter hypopygium is broadly emarginate, the finger-like prolongations of the sides of the excision dark in color and the basal pair of black acuminate processes straight and approximate. Unless the hypopygium is open these structures are not to be seen. The femora usually lack the distal black spot and always are devoid of the row of denticles. Moreover, the maculation of the abdominal segments is not in the form of small setigerous spots.

Minettia nubila sp. nov.

♀. Length 4 mm. Body with antennæ, mouth-parts, legs and halteres entirely flavous, wings hyaline with yellowish tinge, the cross-veins broadly blackish. Third antennal joint oval, one-half longer than deep, the black arista moderately long-plumose, the hairs of the lower side nearly as long as the upper. Front slightly longer than broad, not shining; ocellar bristles long, located on a line with the posterior ocelli but in back of the front ocellus; hairs of lower facial ridge minute; postverticals strong. Thorax lightly dusted, subshining, not vittate, thoracic bristles relatively strong, four dorsocentrals, the foremost much in front of suture, four rows of acrostichals, the middle rows setiform, two sternopleurals, scutellar bristles convergent. All the abdominal segments but the first with submarginal rows of bristle-like hairs. Brown cloud of anterior cross-vein extending along the third and fourth veins to form an H-shaped spot, brown of posterior cross-vein similarly extending on the fourth vein, but not on the fifth, so that its outline is narrowly triangular.

One specimen, collected near Chicago, Illinois, August 10, 1901. Another typical specimen in Professor Aldrich's collection is labeled Lawrence, Kansas.

VAR. A female specimen from Hood River, Oregon, in Professor Aldrich's collection differs in having the bristles reduced in size. The genitalia are small, with the lamellæ of the ovipositor blackish and densely dark-pilose. The front is relatively a little broader and the clouds of the cross-veins are less distinct.

Minettia ordinaria sp. nov.

♂. Length 4 mm. Dull testaceous including the appendages; wings hyaline, the cross-veins with faint clouds. Third antennal joint broadly oval, the black arista with very short pubescence. Front slightly longer than broad, opaque with reddish pollen, except that the orbital bristles arise from spots of yellowish-gray pollen. Ocellar bristles moderate in length, spaced apart a little more than the width of the front ocellus, the lesser ocellar bristles distinct; occipital setulæ and those of lower facial ridge conspicuous, the foremost like an oral vibrissa. Thorax opaque, not vittate; setulæ of thorax well developed, forming six acrostichal rows; mesopleuræ with numerous setulæ in addition to the usual macrochæta; three dorsocentrals, all postsutural. Marginal setæ of third and fourth abdominal segments as long as the segments: hypopygium, small, the lamellæ retracted. Tibial spurs of moderate length. Penultimate section of fourth vein two-thirds the length of the ultimate section.

One specimen, collected in 1897 at Chicago, Illinois, and another in Professor Alfdrich's collection taken at Lawrence, Kansas.

Minettia fumipennis sp. nov.

♂. Length 5 mm. A stout and large species easily recognized by its strongly infumated wings. Very close to *flaveola* Coquillett, differing only in the dark wings, more protuberant center of the face and shorter plumosity of the arista. In *flaveola* the hairs of the upper side of the arista are as long as the depth of the third antennal joint and also conspicuously longer than the hairs below. In *fumipennis* the hairs of both sides of the arista are of the same length and are less than one-half the depth of the third antennal joint, i. e. short-plumose. The infuscation of the wings is strongest in front: along the hind border the wings are subhyaline. Chætotaxy and structure as in *flaveola*. Color testaceous.

One specimen in Professor Aldrich's collection, taken near Stanford University, California, 21 October, 1905.

Sapromyza cyclops sp. nov.

♀. Length 4 mm. Testaceous yellow throughout, except a shining black spot in center of front, and outer one-half of third antennal joint black. Front one-third broader than long, shining; ocellar bristles strong and closely approximate behind the front ocellus; cheeks two-thirds the eye-height; face flat, the central part sericeous. Third antennal joint nearly twice as long as the width in front of the arista, its upper edge concave so that the upper apical corner is rounded-rectangular; arista microscopically pubescent. Thorax lightly yellow-tomentose, four postsutural dorsocentrals, the rows diverging posteriorly so as to meet a moderately-sized intraalar bristle; six rows of scattered acrostichals; two sternopleurals. The abdomen of the dried specimen is somewhat brownish, lightly pollinose, the last segment shining. Femora with the usual bristles of moderate size. Wings hyaline, with yellowish tinge, veins yellow, the posterior cross-vein darker; anterior cross-vein a little beyond the middle of the discal cell, opposite the end of the first vein; penultimate section of the fourth vein four-fifths as long as the ultimate, last section of fifth vein one-half the length of the posterior cross vein.

The distinguishing characteristics of this species are the yellow color, black-spotted front, black-tipped antennæ with excised antennal joint and nearly bare arista, and clear wings.

One specimen collected by Dr. W. M. Wheeler at Dinwiddie Creek, Wyoming, September 5, 1895.

Sapromyza monticola sp. nov. (fig. 13)

♂ ♀. Length 3.5 mm. Entirely testaceous, except the tip of the antennæ.

Front about one-fourth broader than long, fine-hairy in front, shining, a line connecting the front-orbital bristles would meet the base of the antenna; ocellar bristles spaced apart the width of the front ocellus just behind which they are located, the lesser ocellar bristles minute; face receding, but the clypeus prominent, in color pale yellow, neither shining nor sericeous, the central part of the face is twice as broad as the sides: cheeks scarcely one-half the eye-height, the lower edge with minute hairs: palpi and proboscis yellow, rarely the tip of the palpi blackened: Third antennal joint oval, one-half longer than broad, the outer third to half blackened, the arista microscopically pubescent.

Mesonotum shining, very thinly yellow-pollinose, three postsutural dorsocentrals, four definite rows of acrostichals; one intraalar, apical scutellars convergent, usually but one pronounced sternopleural, mesopleuræ not setulose. Abdomen shining, no long marginal bristles, hypopygium small, compressed. Front tarsi sometimes a little dusky. Wings with decided yellowish tinge, the last section of the fourth vein nearly two times the penultimate section, the last section of the fifth vein nearly as long as the posterior cross vein.

Seventeen males and twelve females. One specimen from Bellingham, Washington, two from Tacoma, all the others from Moscow Mt., Idaho; June to August. One female is a variant in having the anterior cross vein located further towards the end of the wing, so that the penultimate section of the fourth vein is about one-third the ultimate.

Genus **Camptoprosopella** Hendel.

1. Mesonotum and pleuræ each with a median dark vitta; wings strongly infumated. Mex., N. Mex., Col.* (*melanoptera* Hendel)............... **dolorosa** Williston.
   Thorax not or but faintly vittate; wings nearly hyaline....................2
2. Arista densely plumose, third antennal joint somewhat tapering, three times as long as broad. N. J., Fla., Ga.*, N. Mex., Peru; S. Dak. Aldrich. (*xanthoptera* Hendel) (fig. 9).. **verticalis** Loew.
   Arista more loosely plumose, the third antennal joint oblong-ovate, less than three times as long as broad. Me., Ont.*, Mass., N. Y., N. J.*, Pa.*, Ind.*, Ill.*, Wisc., La.*, Ala.*, Tex.*, N. Mex., Col.*, Wyo.*, Cal.*, Mex., Nicaragua,* W. Ind.*, S. Am.; (N. H., Mich., S. Dak., Ia., Kans., Vera Cruz, Oaxaca, Puebla, Cuba, Aldrich) (*cincta* Loew; *plumata* Wulp; *ocellaris* Townsend; *claripennis* Coquillett)................................ **vulgaris** Fitch.

Mr. Aldrich has informed me that Mr. Coquillett corrected the name *clavipennis* to *claripennis* in the separata he distributed, and Mr. C. W. Johnson, who has recently examined his type specimen of this species in the National Museum, writes that it is *verticalis*, under which name he submitted the specimen. The error in describing the species as new under the name *claripennis* was occasioned by Mr. Coquillett's misidentification of the dark colored *dolorosa* as *verticalis*. So writes Mr. Johnson.

Genus **Chætocœlia** Giglio-Tos.

1. Wings brown except most of second posterior cell and the anal angle which are hyaline, brown of center of wing without clear spots; face not or but feebly maculate; thorax brown punctate. Mex. ....**palans** Giglio-Tos.
   Brown of center of wings with clear spots; face with two evident black spots....2
2. The larger part of the second posterior cell and of the anal angle brown, disc of wings with three clear spots, two on fourth vein and one on posterior cross-vein. Mex., S. Am. (fig. 3)..............................**distinctissima** Schiner.
   The larger part of the second posterior cell and of the anal angle hyaline.........3
3. The brown area of the wings between the second and fifth veins with many irregular clear spots; abdominal segments not margined with setigerous black spots. Mex..**caloptera** Hendel
   Wings with two small round clear spots near tip of third vein and another above posterior cross-vein, near which spots the brown is more intensive, discal cell largely hyaline. W. Ind.........................**angustipennis** Williston.

Genus **Griphoneura** Schiner.

Blackish, shining, thorax not vittate; antennæ yellowish, arista plumose; face white-pruinose; legs black, the tibiæ and tarsi brownish; wings yellowish with the apical third brown, more intensive in front. 5 mm. Mex., S. Am. (fig. 5.) ....**imbuta** Wiedemann.

Genus **Procrita** Hendel.

Shining yellow, abdomen black; costal half of wing brown, sharply extending in several places into the hyaline portion. Mex. (fig. 4).........**pectinata** Hendel.

Entirely shining yellow, the small ocellar triangle and the tip of the antennæ alone black; brown of wings including the costal portion, ends of the veins, and the hind cross-vein. Costa Rica......................... **sigma** Hendel.

Genus **Trigonometopus** Macquart.

1. Wings hyaline, cross-veins bordered with brown, third vein with two brown spots; yellow, mesonotum quadrivittate and scutellum brown. Col. ....**punctipennis** Coquillett.
   No round wing-spots...2
2. Costal margin narrowly brown, cross veins slightly clouded; reddish, mesonotun darker laterally. W. Ind. (fig. 8)...............**rotundicornis** Williston.
   Wings with vitta including third and fourth veins and a cloud at end of second vein; yellow, thorax quadrivittate with brown, scutellum brown except a median line. Ga..**vittatus** Loew.

Genus **Physogenia** Macquart.

1. With sub-alar round velvet-black spot.....................................2
   Without such mark on pleuræ; testaceous, thorax obscurely brown-vittate. Cal..**planiscuta** Thomson.

2. Face translucent yellow; thorax weakly bivittate. S. Am., Mex.* (*urina* Giglio-Tos) .... **ferruginea** Schiner.
   Face trimaculate; thorax quadrivittate. W. Ind.*, S. Am.; Vera Cruz, Aldrich (*obscuripennis* Bigot, *variegata* Loew, *nasalis* Thomson) (fig. 6) .... **vittata** Macquart.

This genus is easily recognized by the greatly swollen and translucent face. The species are reddish yellow in color. The brief description of *Lauxania planiscuta* by Thomson brings to mind the other species of Physogenia: the testaceous color, the convex protuberant glabrous face, the position of the anterior cross vein much beyond the end of the first vein and the vittate thorax are rather distinctive characters. Possibly it is a synonym of *ferruginea*. *Lauxania nasalis* Thomson is certainly the same as *vittata* Fabricius. The erect dark stripe of the pleura, surmounted by a velvety black spot, the black dots above the antennæ, and the greatly swollen face indicate the synonymy.

Genus **Pachycerina** Macquart.

The North American species previously assigned to *Pachycerina* are to be found in *Camptoprosopella*. The present species differs from the type of *Pachycerina*, the European *seticornis* Fallen, in the following structural characters which hardly have generic value: The occiput is flattened instead of convex, the face is gently convex instead of bulbous, the anterior fronto-orbital bristles are more strongly inclinate, the third antennal joint is elongate-linear and the short arista is loosely plumose, instead of the antennæ tapering and arista with appressed pubescence. There are three dorsocentral bristles, six distinct rows of acrostichals, one humeral, one presutural, two notopleural, one supraalar, two postalar, one pair prescutellar, four scutellar, the apical pair parallel, one mesopleural, one sternopleural and one prothoracic, all but the last two directed backwards, the sternopleural and prothoracic bristles directed upwards. *Seticornis* has four dorsocentrals and two rows of acrostichals, but the other bristles are arranged as in the following species.

From *Camptoprosopella* the present species differs in the convex face and narrower facial orbits. In *Camptoprosopella* the sides of the face are broad and join the oral margin so that the central portion of the face takes no part in the formation of the cheeks.

Pachycerina ornata sp. nov. (fig. 7)

♀. Length 4 mm. Largely testaceous, the lower part of the head paler yellow, ocellar prominence and a large round spot in center of face shining black. Base of antennæ reddish, becoming black beyond the arista; arista reaching but two-thirds the length of the third joint, loosely plumose, long- above and short-plumose below. Oral margin retracted; proboscis yellow, palpi black. Thorax with the following markings: humeri, scutellum and posterior half of mesopleuræ whitish yellow; two transverse bands blackish, one in front of scutellum including the pteropleuræ, and another including the front half of the mesopleuræ continuing across the notopleural suture to the mesonotal suture and then broadly interrupted across the disc of the mesonotum. Abdominal segments, except the first, with broad subbasal black fasciæ, interrupted along the median line. Legs yellow, front tarsi dusky, all the tibiæ with preapical bristle. Calypteres and fringe yellow, but a dusky spot on the margin. Halteres yellow. Wings hyaline, with a very faint yellowish tinge: anterior cross-vein beyond the end of the first vein, the last two sections of the fourth vein subequal; last section of fifth vein shorter than posterior cross vein and one-sixth the length of the preceding section.

Two specimens from Professor Aldrich's collection, received from Mr. Crawford, who collected them at Dona Marcia, Chiapas, Mexico.

Genus **Lonchæa** Fallen.

1. Arista plumose; third antennal joint short, testaceous; legs piceous, tarsi testaceous. Mex. . . . . **discrepans** Walker.
   Arista bare or short-pubescent. 2
2. Front with a median reddish vitta; venter yellowish, with a broad black stripe; legs brown. W. Ind., Ga. . . . . **glaberrima** Wiedemann.
   Front and venter not red or yellow. 3
3. Antennæ not reaching the oral margin. 4
   Antennæ reaching or surpassing the oral margin. 9
4. Legs entirely black or blackish. 5
   Metatarsi yellow. 6
5. Metallic black, scutellum more green, abdomen deep metallic green. 1.5 mm. W. Ind. . . . . **orchidearum** Townsend.
   Shining black, scarcely at all metallic, abdomen thinly covered with brownish dust; calypteres with brown cilia. 3 mm. Eur., Alaska, Wash.*
   . . . . **deutschi** Zetterstedt.
6. Cheeks bristly; front femora strongly setose beneath; two basal joints of tarsi yellow; calypteres yellow; head, thorax and abdomen deep metallic green; front of ♀ two times as long as wide, its sides parallel. St. Vinc.; Cuba, Aldrich. . . . . **brevicornis** Williston.
   Cheeks hairy, at most with one or two bristles in front; legs not with stout bristles. 7

7. Calypteres fringed with dusky hairs; lunule bare; base of tarsi alone yellow; arista bare..8

Calypteres yellow, with yellow fringe; lunule hairy; tarsi largely or wholly yellow; arista microscopically pubescent; third antennal joint large, longer than broad; front of ♀ slightly narrowed anteriorly; epistome projecting. Eur., La.*; Id., Aldrich..............................**laticornis** Meigen.

8. Third antennal joint orbicular, not longer than broad; front broadly quadrate, not at all narrowed anteriorly, the lunula broadly arched; face retreating, the epistome retracted, the face very wide, its sides white-pruinose; tarsi noticeably flattened. Eur.; Id. Aldrich................**parvicornis** Zetterstedt.

Third antennal joint longer than broad; front of ♀ narrowed anteriorly, the lunula highly arched; epistome projecting; side of face less pruinose and face not unusually wide. Eur.; Id. Aldrich, Mont.*.....**viridana** Meigen.

9. Legs entirely black or blackish..10

At least base of tarsi yellowish..13

10. Head, thorax and abdomen metallic blue-green; antennæ greatly surpassing the oral margin. S. Am., Mex....................**chalybea** Wiedemann.

Head and thorax jet black, or at least but little metallic; antennæ reaching the oral margin..11

11. Vertex opaque, with three shining spots...............................12

Vertex black; abdomen metallic black; legs and antennæ fuscous. Brazil, Cuba, N. H. (*nigra* Wied., 1830, nec. Meig. 1826)..**wiedemanni** Townsend.

12. Anterior cross-vein beyond the apex of the auxiliary vein; calypteres pale yellow. Eur.*; Wash., Wisc. Aldrich..................**vaginalis** Fallen.

Anterior cross-vein before the apex of the auxiliary vein; calypteres fuscous. Eur., Alaska.................................**hyalipennis** Zetterstedt.

13. Calypteres with white cilia..14

Calypteres with blackish cilia...15

14. Head, thorax and abdomen deep shining black; wings tinged with light brownish yellow; metatarsi yellow. W. Ind..............**longicornis** Williston.

Thorax and abdomen more or less metallic blue-violet or bluish green; face entirely white-pruinose, nearly flat in profile; wings hyaline; tarsi yellow except the tip brown. Mass., N. H., N. Y., N. J., Pa., Ga., La.*, Ind,, Ill.*, S. Dak.*, Ariz., Wash.*, Mex. [*polita* Say (1830); *cœrulea* Walker (1849) *rufitarsis* Macquart (1851)] (fig. 15).............**polita** Say (1830)

15. Thorax pilose; front shining black. Eur., Ga., Id.*..........**tarsata** Fallen.

Hairs of thorax relatively short; front matte-black. Eur., Alaska. ....**albitarsis** Zetterstedt.

Genus **Palloptera** Fallen.

1. Cross-veins not bordered with brown; thorax gray-pollinose; auxiliary and first vein and apex of wing brownish. Alaska, Wash.* (fig. 21) ....**terminalis** Loew.

Cross-veins bordered with brown; thorax and abdomen yellowish..........2

2. First vein wholly included in the brown color, costa wholly or almost entirely brown..3

First and auxiliary veins brown only at costa, the base and middle of costa not brown, wing also tipped with brown. Eur.*, N. H. (fig. 17) ....**arcuata** Fallen.

3. Front half of wing and posterior cross vein broadly brown................4
   Wings mostly hyaline, the submarginal cell clear except at tip. Alaska, Wash.* Id.*, Col.; Cal., Nev. Aldrich. (fig. 19)..................**jucunda** Loew.

4. Head, thorax and abdomen largely cinereous-pruinose; brown pattern of wings sharply defined; abdominal segments setose; four rows of acrostichals. Mich. (figs. 16, 20)...................................**setosa** sp. nov.
   Head, thorax and abdomen shining yellow; brown of wings diffusing into hyaline portion...5

5. Abdomen setulose, but with strong marginal bristles arising from black spots; acrostichals dense. N. J.*, Pa., Que., N. H.; Va., Ia. Aldrich. ....**superba** Loew.
   Abdomen with hind edges of the segments narrowly and the sides broadly margined with black. Me............................**similis** Johnson.

Palloptera setosa sp. nov.

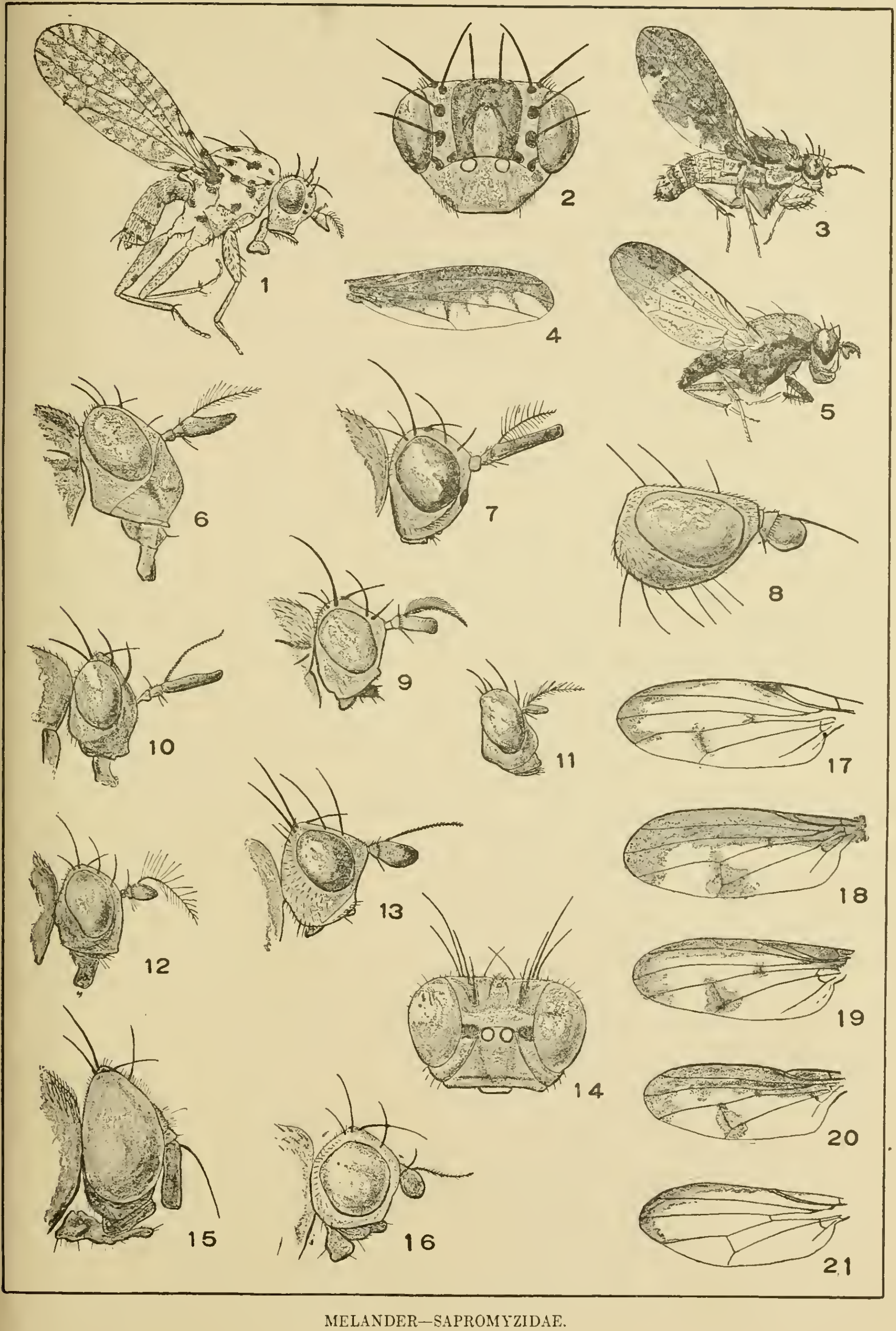
♂ ♀. Length 3.5 mm. Pale cinereous in color covered especially on occiput and mesonotum with whitish gray pruinosity; anterior portion of front, face, cheeks, scutellum, pleuræ, abdomen, halteres, calypteres and legs becoming yellowish; base of antennæ and mouth-parts testaceous; outer portion of third antennal joint infuscated. Arista dusky, pubescent. Four dorsocentrals, one of them presutural, four rows of sparse delicate acrostichals. Abdominal setæ arising from minute black dots, rather robust, the marginal ones a little stronger; fifth abdominal segment elongate. Anterior half of wing, apex and broad cloud about posterior cross vein infumated, a small clear costal spot just before the end of the auxiliary vein, the brown surrounding the cross-veins more saturate, remainder of wings clear hyaline; posterior cross-vein at right angles to the fifth vein; last section of fourth vein arched

Two males and one female collected by Professor Aldrich at Battle Creek, Michigan. The female has a slender hyaline stripe extending down the middle of much of the submarginal cell.

EXPLANATION OF PLATE 3.

1. *Poccilomyia* (new genus of Sciomyzidæ) *decora* Loew.
2. *Poccilomyia dceora* Loew. Front and face.
3. *Chætocoelia distinctissima* Schiner. From Hendel.
4. *Procrita pectinata* Hendel. Wing, from Hendel.
5. *Griphoneura imbuta* Wiedemann. From Hendel.
6. *Physogenia vittata* Macquart. Profile of head.
7. *Pachycerina ornata,* new species. Profile of head.
8. *Trigonometopus rotundicornis* Williston. Profile, from Williston.
9. *Camptoprosopella verticalis* Loew. Profile of head.

10. *Lauxania cyclindricornis* Fabricius. Profile of head.
11. *Xangelina nigra* Williston. Profile of head, from Williston.
12. *Caliope gracilipes* Loew. Profile of head.
13. *Sapromyza monticola,* new species. Profile of head.
14. *Minettia lupulina* Fabricius. Front and face.
15. *Lonchæa polita* Say. Profile of head.
16. *Palloptera setosa,* new species. Profile of head.
17. *Palloptera arcuata* Meigen. Wing.
18. *Palloptera superba* Loew. Wing.
19. *Palloptera jucunda* Loew. Wing.
20. *Palloptera setosa,* new species. Wing.
21. *Palloptera terminalis* Loew. Wing.



MELANDER—SAPROMYZIDAE.

A SYNOPSIS OF THE DIPTEROUS GROUPS AGROMYZINÆ, MILICHIINÆ, OCHTHIPHILINÆ AND GEOMYZINÆ.

By A. L. Melander

[Reprinted from the Journal of the New York Entomological Society, Vol. XXI, Nos. 3 and 4, September and December, 1913.]

[Reprinted from JOURNAL OF THE NEW YORK ENTOMOLOGICAL SOCIETY, Vol. XXI, No. 2, June, 1913.]

A SYNOPSIS OF THE DIPTEROUS GROUPS AGROMYZINÆ, MILICHIINÆ, OCHTHIPHILINÆ AND GEOMYZINÆ.[1]

By A. L. MELANDER,

PULLMAN, WASHINGTON.

There need be no apology offered for the issuance of the following paper. Our species have been neglected; many of the commonest forms remain unidentified; there is no adequate tabulation of the species or even of the genera, and the determination, therefore, of a species necessitates laborious searching among scattered descriptions; furthermore, a surprising number of European species occur also in America. Although based almost entirely on my own collection, and therefore necessarily far from a complete treatment, this contribution brings to light so many species new to America as to justify its appearance in print. It will at least serve to unify our present knowledge of this series of important groups.

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[1] Contribution from the Zoölogical Laboratory of the State College of Washington.

The species discussed in this paper are those grouped in the Agromyzidæ and Geomyzidæ of Williston's Manual. These small flies belong to that division of the Acalyptrate Muscidæ where the auxiliary vein is more or less rudimentary, ending, together with the first longitudinal vein, distinctly before the middle of the wing; the basal cells small and manifesting a tendency toward becoming incomplete, but the anal cell almost always formed, although never produced. The head is spherical or hemispherical, conical only in *Selachops;* is schizometopic, which means that the frontal orbits are continuous with the facial orbits and with the genæ; the orbital bristles descend to below the middle of the front; the center of the face is usually depressed below the level of the orbits, and is not large nor arched, protuberant only in *Sinophthalmus;* the arista is rarely loosely and long plumose, is usually quite bare, but ranges to long-pubescent or even plumose; the scutellum has protuberances only in *Rhodesiella;* the posthumeral bristle is regularly absent; the legs are never greatly lengthened and very rarely thickened; the tarsi are always slender, with the metatarsus the longest joint. The oral vibrissæ may be present or absent, the wings may be pictured or not, the body may be stout or rather slender; the color may be dark or light, and the proboscis may be long or short. The vestiture may consist of a dense pruinosity or the insect may be highly polished, while the body may have many or few bristles, or may be clothed with hairs.

While the limits of the combined group here discussed are relatively easily fixed, there being but few genera that have been questioned,[1] it has not proved so easy to define the boundaries of the subfamilies within the group. Various writers have reassigned doubtful genera here and there, as will be seen in their discussion at the close of this introduction.

Hendel and Czerny, recognizing the importance in phylogeny of hidden characters that have not been influenced by the mode of life of the species, have proposed the most satisfactory outlines of the subfamily limits, emphasizing such apparently trivial but ancestral characters as the convergence or divergence of the minute postvertical bristles, the manner of fracture of the basal portion of the costa, and the intimate structure of the interfrontalia of the head. The form of the proboscis, the structure of the legs, the venation, particularly of the outer part of the wings, and the style of vestiture have been too recently modified, as measured in biologic time, to be of much service in indicating the interrelationships of subfamilies.

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[1] *Siligo* Aldrich was described as a Helomyzid; *Pelomyia* Williston as an Ephydrid; *Eusiphona* Coquillett as a Tachinid; *Lestophonus* Williston as an Oscinid.

As will be noted the following analytical table makes use of characters that are not customarily employed and which require considerable magnification for their discernment. A few words will be needed to explain the terminology adopted. The structure of the cheeks, face and front has proved of great assistance in determining subfamilies: not the general shape, but the vanishing details of the proportions of the sclerites making up the head. The cheeks, that lateral portion between the eyes and the mouth, are a complex of several sclerites. Nearest the eye, the facial orbits, what the Germans designate as Wangen, descend from in front, their delimiting suture continuing straight downward or obliquely backward or even parallel with the eye-margin before it vanishes. This part of the cheek, nearest the eye, I have designated the gena, following Dr. Hough's selection of this term in his Muscidæ of Somaliland, 1898.[1] Next to the gena lies a varying-shaped piece, called by the Germans the Backe, and by Dr. Hough the bucca. The oral vibrissa is always located near the lower front angle of this piece, but the shape of the sclerite varies greatly. In the Opomyzinæ it is linear and parallels the narrow gena; in the Milichiinæ it is triangular, owing to an oblique extension forward of the lower occiput, in which case the cheek consists largely of this part of the occiput. Where the relative breadth of the bucca and the gena is called for the measurement should be made near the vibrissal angle, but, since the suture between these sclerites vanishes, its course may need to be projected as a continuation of that part present. In many of the Geomyzinæ the lateral prolongations of the center of the face are visible beneath the buccæ, thus forming the real margin of the mouth. These four sclerites which enter into the composition of the cheeks, probably originally sharply differentiated, are now in such a state of fusion that their discernment is rendered a matter of some difficulty, requiring the use of a compound microscope.

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[1] The term *gena* is in Greek *geneion,* in Italian *guancia,* in Spanish *mejilla,* in French *joue,* and in English *jowl,* but these cognates indicate merely the cheek in a generic sense.

For many years the Acalyptrate Muscidæ have been lined up in two groups according to the course of the auxiliary vein. The distinctness with which this vein is separated from the first longitudinal is at most a matter of relativity, but since the auxiliary vein is an ancestral relict in a modern group of insects, its course does serve to interpret phylogeny. Heretofore the auxiliary vein has been cursorily looked at and has been accounted absent when there is no distinct chitinization. A close examination, both by transmitted and by reflected light, reveals a fold in the wing membrane even where the vein is lacking, and thus the former course of the vein can be determined. For exactness this part of the wing must lie flat in the field of vision. Moreover, the costa is frequently broken at the end of the auxiliary vein, whether the vein itself is present or not, and, therefore, the exact position of the costal break affords a valuable clue to the ancestral history of these flies. Just beyond the humeral crossvein the costa may be again broken, clearly discernible by transmitted light, the break occurring where some of these flies, such as *Stegana* and *Drosophila,* still fold down their wing. A distinct break at this place is characteristic of the Milichiinæ, Drosophilinæ and Ephydrinæ, but does not occur in any of the Agromyzinæ, Ochthiphilinæ, Geomyzinæ, and several of the other groups. As a single character this costal fracturing is probably as weighty as any.

The lengths of the crossveins as compared with the segments of the longitudinal veins, the proportions of the sections of the costa, and the course and termination of the longitudinal veins are all variable within certain limits, but are useful characters for less than generic determination. The shape of the calypter and the character of its fringe of cilia, the form of the alula and of the anal angle of the wing, the extent of the basal cells and of the anal vein, the position of the crossveins, the origin of the third vein, the strength of the fourth and fifth veins in particular, the hairiness of the basal section of the costa, all offer characters of more than generic value, probably having been under less rigorous selection than structures in the outer part of the wing.

Naturally, chætotaxy is important here, as it is in related Muscidæ. Not only the number of bristles and their exact location but even their inclination must be observed. This is particularly true of the bristles on the front. The presence or absence of the anterior dorsocentrals, of the presutural, of the sternopleural, mesopleural, and rarely of the pteropleural, the number and direction of the scutellars, require notice. The postverticals, oral vibrissa, preapical tibial bristles, acrostichal and mesopleural setulæ, prothoracic bristles and the hairs of the second antennal joint are taxonomically important. The ocellars, vertical bristles, occipital, supra-alar, coxal, femoral and abdominal bristles are less utilized. However, any of the bristles may vary, and absolute stress should not be laid on the presence or absence, size or inclination of certain of the hairs. Within reasonable limits the chætotaxy is reliable and offers a most valuable guide to the genera and species.

Within the group the proboscis is quite variable. It is twice broken, the basal and end sections directed backward, the middle section forward. Sometimes it is short and largely fleshy (*Meoneura, Chiromyia*), again it is elongate, slender, strongly chitinized and resembles a piercing organ (Milichiina). Even where it is of medium size the labella may be broad and fleshy (*Rhicnoessa*) or may be needle-like (*Desmometopa*). The palpi range from large and porrect to small. Their shape and hairiness should be noted. The development of the clypeus (variously called the prelabrum, upper-lip, fulcrum, pharynx, Schlundgerust, Chitinhufeisen) is important. Hendel restricts the term clypeus to the center of the face (antennal foveæ, Gesichtsleiste), a structure which still lacks a convenient English name. The center of the face is bounded by the facialiæ or facial ridges, which are more or less evidently separated from it and from the genæ. Sometimes the front is complex, with paraorbits, interfrontalia, ocellar triangle, cruciate bristles, and specialized stripes (Chitinleisten) between the paraorbits and the ocellar triangle, all of which may be present (*Desmometopa*), marking the front with a letter M. Sometimes the front is simple, pollinose or not, but with the ocellar protuberance alone differentiated. The shape of the lunule is also noteworthy.

The shape and hairiness of the third antennal joint and less so of the second; the development of the arista, whether slender, elongate, pubescent, or with small or large basal segment; the excavation or convexity of the upper occiput, and the profile of the head should be noted. Less important is the structure of the thorax, abdomen and legs. The hypopygium is enlarged only near *Tethina,* and the ovipositor is specialized rarely outside of the Agromyzinæ, where it is cuneiform or tubular. However, the number of abdominal segments is not constant, and should be observed.

In describing genera these preceding characters should be mainly noted. Meigen, Zetterstedt, Schiner and Loew lived before the days of chætotaxy and their descriptions are hard to interpret into the following tables. These tables have been constructed from what specimens I have had to study, and I am not answerable for the correct assignment of those genera I know only from descriptions. However, my collection of this group includes thirty-seven genera, one hundred and sixty-five species and about two thousand specimens, mainly, of course, North American, and without such a representation this work would have been impossible. The lack of definite information in the older descriptions concerning characters now considered important has made it necessary at times to select characters that we would not willingly stress. The identification tables are thus largely artificial; some of the groups seem natural and phyletically related, but often the association of genera and species in the tables is due to the arbitrary emphasis of some selected character. All the genera hitherto known, the world over, are included in the tables of genera, but only the species known to occur in North America are given in the tables of species. In presenting them I trust that the tables will be workable, and that they will help and not hinder other students in unraveling the intricate species of this little known group.

The nearest relatives of the species herein discussed are the Drosophilinæ, Oscininæ and Ephydrinæ. In fact, the Geomyzinæ are more nearly related to the Drosophilinæ than they are to the Agromyzinæ. *Acarthrophthalmus* of the Heteroneurinæ closely resembles the Agromyzinæ, but its auxiliary vein is more distinct and separate from the first vein and the break in the costa is near the humeral crossvein.

The accompanying tabulation of characters is given for the principal groups with which the species discussed herein might be confused. In explanation, the sclerites comprising the cheeks, the lower occiput, gena, bucca and center of the face are abbreviated *O, G, B* and *F,* respectively, and the most important one is mentioned first. Where there is but one costal break it occurs near the end of the

	Geomyzinæ.	Agromyzinæ.	Melichiinæ	Ochthiphilinæ.	Drosophilinæ.	Oscininæ.	Ephydrinæ.	Heteroneurinæ.	Psilinæ.
Costa broken	Once	Once	Twice	None	Twice	Once	Twice	Not, or once	Once
Auxiliary vein ending in	Costa	1 vein usually	Costa	Costa	Rudimentary	Rudimentary	Rudimentary	Costa	1 vein
Anal cell	Present	Present	Present	Present	Present	Absent	Absent	Present	Large
Basal vein of discal cell	Present	Present	Present	Present	Usually absent	Absent	Absent	Present	Present
Anal vein	Base present	Base present	Rudimentary	Base present	Base present	Absent	Absent	Base present	Present
Cilia of calypteres	Loose to rudimentary	Dense	Rudimentary	Abundant	Rudimentary	Variable	Variable	Loose	Loose
Cheek consisting of	G.B.F.	B.W.	O.B.G.	G.B.F.	G.B.F.	B.G.	G(B)F.	O.G.B.	O.G.B.F.
Clypeus	Large	Small	Small	Small	Large	Rudimentary	Very large	Small	Small
Interfrontalia differentiated	Present or absent	Small	Large	Not	Large	Large		Small	Small to large
Frontal orbits differentiated	Usually absent	Often present	Present	Absent	Present	Absent	Present	Absent	Absent or present
Center of face	Inset	Flat	Sunk	Flat	Concave		Raised	Concave	Flat
Postvertical bristles	Converging	Diverging	Converging	Converging	Converging	Converging	Converging	Diverging	Diverging or wanting
Oral vibrissa	Present or absent	Present	Present	Absent	Present	Absent	Absent	Present	Present
Foremost orbital bristle	Reclinate	Convergent	Convergent	Reclinate	Proclinate	Wanting	Divergent	Various	Wanting
Interfrontal bristles	Absent or present	Absent	Present	Absent	Rare	Absent	Present or absent	Present or absent	Absent
Prothoracic bristle	0–2	1	Absent	Absent	Absent	Absent	Absent	1 or 0	Absent
Mesopleural bristles	Present	Present	Rare	Absent	Absent	Absent	0 to several	Present	Absent
Arista	Pubescent	Closely pubescent	Loosely pubescent	Bare	Plumose	Sub-bare	Bare to plumose	Sub-bare to plumose	Pubescent

auxiliary vein, except in *Acarthrophthalmus* as noted above: where the costa is twice broken the first fracture is near the humeral cross-vein and the second at the end of the auxiliary vein. This tabulation is not infallible, but gives the characters usually and typically found. It is often a difficult matter to know to what subfamily of the smaller Muscidæ a specimen should be assigned. The tabulation may therefore be found useful in verifying an identification.

In glancing over the enumerated species it will be noted that *Agromyza* is by far the dominant genus, followed by *Phytomyza,* which is a close relative. The remaining genera have but one or a few species. The characters by which many of the smaller genera are distinguished, such as the number of fronto-orbitals or dorsocentrals, the shape of the cheeks and the size of the eye, have a range of variability in *Agromyza* equal to that found in a series of the small genera, but can not be utilized for the segregation of this complex genus. In *Agromyza,* especially, the profile of the face can not be relied on too strictly. Apparently the drying of the head vaults the mouth-opening so that the epistome at times is projected more than at others and thus in some specimens it becomes visible in profile. The shape of the lunule may likewise change, according to the age of the specimen. In this genus *Agromyza* it is often impossible to determine what are varietal and what are specific limits. For instance, couplet 59, separating *melampyga* and *scutellata* is unsatisfactory, containing characters most trivial than some of the varietal characters given under those species. Extreme variations, like the black *orbona* and the yellow *melampyga,* would appear obviously distinct, but the other forms exhibit gradations connecting these extremes in every particular. The discal cell varies from small to medium, the width and shape of the front is inconstant, the maculation of the body and legs ranges over almost the entire gamut of coloration in this genus, so there is little that is tangible to use in limiting the species. Under such circumstances my determinations can not be considered infallible, but with determined European material before me for comparison the identifications given may be utilized until the type material is compared with larger collections of specimens. It is not unlikely that the less ornate species are similarly variable and that the number of described species will be materially reduced when much larger collections are studied. In several instances in the dichotomy I have grouped a number of characters that are correlated in the specimens before me. The descriptions of the older authors are often silent regarding some of these characters, *e. g.*, the color of the calypteres, the number of fronto-orbitals or dorsocentrals, the details of venation, etc. Rather than encumber the key with repeated statements that the correlation of characters is based on the specimens studied and is not known to hold in those species that I do not possess, I have left it for the list of localities to indicate those species I have, and those concerning which there might be doubt. The localities include, in addition to places already recorded, the localities of specimens in the collections of Dr. Garry deN. Hough, now at Chicago University, and of Professor J. M. Aldrich. Those places from which I possess specimens are marked with a star (*).

While in the preparation of this paper I have depended almost entirely on the material in my own collection, still I wish here to express my appreciation of the good-will of my friend, Professor Aldrich, who has always been ready to share his collection and library whenever asked. For some years our common interest in these flies has brought out many inductions that working independently we might have missed. Mr. Charles W. Johnson has also generously sent his species of *Spilochroa* for examination.

The work on these small flies has practically all been done under the Zeiss prism binocular microscope, using mainly the a_3 objective and number 1 ocular. While a magnification of but thirty-one diameters is thus produced, the clearness afforded by stereoscopic vision has certainly repaid the extra labor of centering the specimens in the field of the microscope. Indeed, the hand lens has been practically discarded as incapable of resolving such difficult characters as the fracturing of the costa or the boundaries of the sclerites of the head. In this connection I wish to call attention to the insect holders, made by the Spencer Lens Company and the Ernst Leitz Company, a ball and socket attachment that easily enables a specimen to be viewed in any position under the microscope. For extra illumination needed in deciding difficult points I have attached over the field of the microscope a small low-voltage tungsten automobile headlight. By placing the lamp beyond the focal point the parabolic reflector concentrates the light on the specimen. A step-down transformer furnishes low voltage and a small rheostat regulates the intensity of illumination, which can thus be instantly changed from a glow to twenty-five candle power.

A few genera which have not found their final resting place in the present systems of classification are discussed in the following notes. The first five of these genera are not included in the table of genera, the other three are.

Aulacigaster Macquart, which has been variously assigned to the Agromyzinæ, Geomyzinæ, Drosophilinæ and Ephydrinæ, has the second basal cell confluent with the discal, the anal cell well-formed, the auxiliary vein relatively distinct and entirely separate from the first vein, the costa broken at the humeral crossvein and again at the auxiliary vein, the clypeus very large, the center of the face continuing laterally under the buccæ so as to comprise a large part of the cheeks, the anterior fronto-orbitals proclinate and the postverticals convergent. This combination of characters clearly places it in the Drosophilinæ notwithstanding its bare arista. The West Indian species figured by Williston in his Manual, page 292, agrees with *rufitarsis* except that the auxiliary vein ends in the first in Williston's figure and the arista is pubescent.

Cyrtonotum Macquart has the costa twice broken. The structure of the orbital bristles, the face, cheeks and mouth is also like that of the Drosophilinæ.

Leiomyza Macquart was reported by Williston, Entomological News, vii, page 185, from America, but no species was described. Becker places this genus with *Aulacigaster* in the Drosophilinæ. I have no specimens and so have no opinion to offer.

Lipochæta Coquillett, which Williston once referred to the Ochthiphilinæ, has the costa twice broken. It is a curious Ephydrid.

Sephanilla Rondani, described from Italy in 1874 and not since reported, was placed by its author with *Leucopis* and *Ochthiphila*. It is, however, a shining black species, the front with a transverse yellow band above the antennæ, the mouth-parts, antennæ, halteres and legs in part light-colored. The lack of pruinosity, the basal position of the crossveins and the course of the auxiliary vein would indicate a Geomyzid or perhaps a Sapromyzid. It is not sufficiently characterized to find a place in the table.

Pseudopomyza Strobl, located by the author in the Drosophilinæ or Geomyzinæ, is placed by Hendel close to *Desmometopa*.

Hendel's figures show the proboscis to be like that of *Rhicnoessa* and the wing like that of *Desmometopa.* It is included twice in the key to the genera in order to avoid confusion.

Rhicnoessa and **Tethina** have been variously shifted. The front sometimes possesses hairs similar to the cruciate bristles of the Milichiinæ, in which group they have usually been tabulated, but the structure of the face and cheeks is very much like that found in the Geomyzinæ. With the latter group they find their best location, as is shown by the single break in the costa, the pollinose body and especially the pollinose front, the more or less excavated occiput, and the strong bristles, particularly of the pleuræ, such as the paired prothoracic and the row along the posterior side of the mesopleuræ. However, the auxiliary vein terminates in the first vein leaving the break in the costa close to the end of the first vein, and not some distance before, as is otherwise the case in the Geomyzinæ before me, while the chitinized and lengthened proboscis and the sometimes prominent visbrissal angles show great similarity to Milichiine characteristics. Professor Aldrich first suggested to me the identity of *Pelomyia* Williston with *Tethina.*

TABLE OF SUBFAMILIES.

Auxiliary vein separated from the first vein, sometimes touching it before the end and then again separating so as to end much before the termination of the first vein; postverticals convergent or wanting; costa complete, at most slightly weakened just before the end of the auxiliary vein; densely gray-pruinose species, abdomen usually pictured with brown or black spots; oral vibrissæ wanting or not differentiated; frontal suture transverse, not highly arched: interfrontalia differentiated only by a difference in color or sheen of the pollen, without cruciate inner frontal bristles, the ocellar triangle pollinose; occiput flattened; oral margin not deeply excised in front, center of the face broad, relatively flat and not impressed beneath the plane of the orbits, no vibrissal angle; genæ and buccæ of cheeks not differentiated; proboscis short, not bent back at the end; prothoracic bristles wanting; one posterior sternopleural; mesopleuræ usually bare, rarely with sparse setæ; front femora with a series of uniform bristles on the outer flexor edge; no preapical bristles on tibiæ, middle tibiæ with apical spur; calypter large, ciliate; anal angle of wing well developed, anal vein entirely rudimentary, basal cells complete. . OCHTHIPHILINÆ.

Auxiliary vein fused with the first vein for much of its length, or entirely rudimentary; costa broken at least before the end of the first vein;

rarely silvery-gray pruinose; oral vibrissæ often present; frontal suture usually arched, sometimes flattened......................2.

2. Costa broken twice, once beyond the humeral crossvein at which place there is usually a stronger costal bristle, and again just before the end of the first vein; hairs of oral margin borne wholly or largely on the lower occiput which arches forward under the eye, the genæ greatly reduced, leaving the buccæ more or less triangular, with the oral vibrissa at its front angle; face in profile concave, the vibrissal angle often prominent and projecting as far as the level of the frontal suture; a double row of cruciate bristles present along the middle of the front, borne sometimes on specialized stripes, the interfrontalia often evident and formed from the enlarged ocellar triangle; oral margin often arched in front; proboscis geniculate, and usually lengthened, the labella rarely fleshy; postverticals convergent, rarely parallel or wanting, but never divergent; anterior dorsocentrals, prothoracic, and mesopleural bristles rarely present; calypter small, rarely densely ciliated; anal vein entirely rudimentary or wanting.
MILICHIINÆ.

Costa not, or but very rarely, broken at the humeral crossvein, and without corresponding bristle; bucca quadrangular or linear, or if triangular usually broader behind, the occiput rarely reaching forward on the cheeks, the hairs of the oral margin therefore together with the vibrissa borne by the bucca; face retracted or the vibrissal angle not evident, produced only in some species of *Rhicnoessa* and *Tethina;* front usually devoid of cruciate bristles, though sometimes hairy; ocellar triangle usually reduced, insect often pollinose; oral margin not highly arched in front; proboscis short, usually very short, labella rarely chitinous; prothoracic and mesopleural bristles usually present; calypter usually large and densely ciliate; base of anal vein usually evident ....3.

3. Postverticals divergent, rarely wanting; basal joint of arista minute, shorter than broad, the remainder of the arista closely short-pubescent; auxiliary vein, though rudimentary, usually ending in the first vein instead of in the costa (sometimes, *e. g., Phytomyza, Cryptochætum,* the auxiliary vein parallels the first vein for its entire course) and rarely (*e. g., Agromyza* spp.) it approaches the first for a short distance to bend away at the tip; the break of the costa at the end of the auxiliary vein, therefore, usually just in front of the termination of the first vein; genæ narrower than the buccæ (except in *Phytomyza* spp.); upper occiput not deeply concave; prothoracic bristle single.
AGROMYZINÆ.

Auxiliary vein more or less distinct from the first vein and ending separately in the costa at a greater distance from the first vein than its separation from it along the middle of its course, rarely the end of the auxiliary vein has completely vanished, in which case the fracture of the costa some distance before the ending of the first vein indicates its former course (in *Rhicnoessa* and *Tethina* the auxiliary vein ends in the first vein); genæ broader than or as broad as the buccæ; postverticals convergent or wanting; antennal arista often loosely pubescent or plumose, the basal joint always longer than wide, sometimes even elongate and hairy; often the hairs of the oral margin are in more than a single row; upper occiput often markedly concave; prothoracic bristle sometimes paired.....................GEOMYZINÆ.

SUBFAMILY OCHTHIPHILINÆ.

TABLE OF GENERA.

But two posterior dorsocentrals; postverticals wanting; third antennal joint short, reniform, the arista short and rather thick.................2.

Presutural and postsutural dorsocentrals present; postverticals convergent; third antennal joint longer, its upper outer end rather angulate.....3.

2. Ocellar and fronto-orbital bristles wanting; palpi broad; mesonotum with numerous setulæ; one presutural; second antennal joint bristleless; mesopleuræ and pteropleuræ bare; alulæ large and rather pointed. (Europe, Asia, North America.)..................*Leucopis* Meigen.

A pair of ocellar and two fronto-orbital bristles present; second antennal joint with a bristle on the upper side; mesopleuræ and pteropleuræ with sparse setulæ. (Europe.)..................*Cremifania* Czerny.

3. Head flattened, triangular, pointed at the insertion of the antennæ, face nearly horizontal; eyes horizontally oval; wings pictured. (Europe, North America.)...........................*Acrometopia* Schiner.

Head more rounded, front not projecting; eyes rounded, not transverse..4.

4. Dorsocentrals 1 + 2; no mesopleural bristles; foremost fronto-orbital anterior to the middle of the front; head but little broader than the thorax. (Europe, Asia, North America.)........*Ochthiphila* Fallen.

Dorsocentrals 1 + 3 (or 4); mesopleuræ sometimes with setulæ; foremost fronto-orbital opposite middle of front; head conspicuously broader than the thorax. (Europe.)................*Parochthiphila* Czerny.

LEUCOPIS Meigen.

Densely gray pruinose species of bluish-white luster, the abdomen more purely white-gray. This pruinosity seems to increase with the maturity of the individual, so that it does not altogether have specific value. I have one specimen, presumably *simplex*, where even the antennæ and palpi are completely coated. The maculation of the abdomen and the distinctness of the thoracic stripes are quite variable. Indeed, it is doubtful if the species listed in the table represent valid species, for there is much gradation. Most of my specimens belong to *griseola,* a species which has not been hitherto reported from America. Some individuals lack entirely the spots of the abdomen; in others there is a tendency to forming the median stripe of *bella.* Quite probably many of the records of *bella* should be referred to this species. However, *griseola* is reported aphidivorous while *bella* is coccivorous.

Table of Species of *Leucopis.*

Front tarsi wholly or principally yellow .... 2.

Front tarsi wholly or principally black; thorax with two central linear cinereous black and two other broad brown vittæ; first abdominal segment blackish, the second with a pair of black dots; front bivittate with black; base of antennæ pruinose; legs black or cinereous, the knees and base of posterior tarsi yellow; wings whitish, the costa infuscated. 1–1.5 mm. (Eur.;* Ga.,* La.,* Id.,* Wash.*) .... *griseola* Fallen.

2. Abdomen immaculate, thorax and front not vittate; legs black, the tibiæ at base and tip and the tarsi yellowish; wings hyaline. 1.5 mm. (N. Y., Mass., N. J., N. H., D. C., Va., Ga., Mich., Nebr., Wash.*) *simplex* Loew.

Abdomen more or less spotted; thorax with two brown stripes .... 3.

3. Abdomen with first segment cinereous black, the second segment with a pair of blackish spots, and the rest of the abdomen immaculate; thorax bivittate; center of front gray, the orbits more silvery; antennæ black. 2 mm. (Eur.; N. H., N. J., D. C., Ind., La.,* Tex., N. Mex., Cal.*) .... *nigricornis* Egger.

Abdomen marked with additional spots; antennæ more or less pruinose ... 4.

4. Thorax marked with two brown vittæ convergent behind; front bivittate with cinereous black .... 5.

Thorax not vittate with brown; front cinereous; abdomen with two lateral spots and a median basal vittula of velvety black upon segments 2, 3 and 4. (Nebr.) (Can. Ent., XLII, 241, 1910.) .. *maculata* Thompson.

5. Abdomen with the first segment black except the margins, the second marked with three spots, the third and fourth with a median basal black spot; antennæ cinereous; wings milky. (W. Ind., Fla., Col., Can., Cal., Mex.) .... *bella* Loew.

Abdomen with the first segment marked with deep brown except laterally and posteriorly, the second, third and fourth segments with a slender subinterrupted stripe and a pair of rounded brown spots, diminishing in size; base of antennæ cinereous; wings hyaline. (Tex.,* N. Mex., Mex., Id.*) .... *bellula* Williston.

ACROMETOPIA Schiner.

Tibiæ and front tarsi black; third antennal joint three times as long as wide, bluntly rounded; front with a broad brown vitta; abdomen with many black dots; basal half of wings with five brown dots, apical half with four fasciæ. 2.5 mm. (Ga.)....................*punctata* Coquillett.

Tibiæ and tarsi yellow; third antennal joint less than two times as long as wide, the apical angle nearly rectangular; segments two to five of abdomen each with a basal pair of black dots; wings marked with numerous dots and streaks. 2 mm. (Cuba.)....*maculata* Coquillett.

OCHTHIPHILA Fallen.

Hendel (Wien. ent. Ztg., XXIX, 313, 1910) and Coquillett (Type Species N. Am. Gen. Dipt., 1910) prefer the name *Chamæmyia* Meigen, 1803, to the generally accepted *Ochthiphila* of Fallen, changing also the subfamily name to Chamæmyinæ. *Chamæmyia* was given by Meigen in Illiger's Magazine as a genus, with no species mentioned. In 1810 Panzer described *Chamæmyia elegans,* and therefore the genus is usually accredited to him. In view of the present sentiment regarding the overthrow of names in general usage, I regard it unnecessary to discard Fallen's name *Ochthiphila.*

Ochthiphila lispina Thomson, from California, is probably the female of *Schœnomyza litorella* Fallen.

TABLE OF THE SPECIES OF *Ochthiphila.*

Antennæ wholly or in part yellow.......................................2.

Antennæ entirely black; palpi dusky...................................4.

2. Third, fourth and fifth segments of the abdomen with broad black fasciæ interrupted in the middle; a vague fascia across the middle of the front, and another narrowly above the lunule; antennæ reddish, the third joint brown above, the arista brownish yellow. 2 mm. (Eur.; N. J.)..*elegans* Panzer.

Abdomen with round black spots or else entirely unspotted; front not fasciate; arista brown.......................................3.

3. Antennæ wholly yellow, sometimes dusky at the base and apex; abdomen usually not spotted, sometimes with small spots on the fifth segment; proboscis and palpi yellow; legs yellow, the femora cinereous black except at the tip. 3 mm. (Eur.; Ont.)........*maritima* Zetterstedt.

Antennæ black, only the middle yellow; abdominal segments two to five, with paired round black spots, laterally also spotted; palpi blackish, apically yellowish. 2–3 mm. (Eur.;* Mass.,* N. Y.,* Can.,* N. J., Wisc., Ill., Wash.*)...........................*polystigma* Meigen.

4. Legs principally black, the knees and hind metatarsi yellow; abdomen with at most three pairs of black spots. 2 mm. (Eur.; Col.) *geniculata* Zetterstedt.

Tibiæ entirely yellow .... 5.

5. Abdomen usually with three pairs of dorsal black spots, and corresponding lateral spots; arista blackish; legs yellow except the base of the femora cinereous black and the end of the tarsi brown. 2–3 mm. (Eur.;* Mass., Col.*) .... *juncorum* Fallen.

Abdomen entirely unspotted, lacking both the dorsal and the lateral markings. 2–3 mm. (Eur.;* Col.,* Wash.*) .... *aridella* Fallen.

SUBFAMILY MILICHIINÆ.

TABLE OF GENERA.

Costa prolonged as a pointed lappet at its break at the end of the auxiliary vein; lower fronto-orbitals bent inward; interfrontal stripes bearing evident cruciate bristles; abdomen often silvery; last section of fourth vein at most two times as long as the preceding section; calypteres with long cilia; cheeks very narrow; mesopleuræ often bristly. (Group MILICHIINA.) .... 2.

Basal section of costa not overlapping the outer section at the break before the end of the first vein; cruciate bristles sometimes reduced; abdomen rarely silvery; last section of the fourth vein at least three times as long as the preceding section; anterior crossvein beyond the costal break; mesopleuræ rarely with bristles; calypteres rarely with dense cilia. (Group MADIZINA.) .... 7.

2. Hind margin of eye not excised; eyes pubescent .... 3.

Hind margin of eye excised at the level of the antennæ: this may be a narrow excision or may continue to the lower corner of the eye .... 4.

3. Mesopleuræ bare; proboscis not remarkably developed, palpi spatulate; face broader. (Europe, Africa, Java.) .... *Milichia* Meigen, sens. str.

Mesopleuræ with three or four strong bristles; proboscis elongate and geniculate, the outer portion long and directed backward; palpi slender; face narrow. (South America, North America.) *Pholeomyia* Bilimek.

4. Mesopleuræ without strong bristles; first segment of male abdomen projecting over the middle of the second segment .... 5.

Mesopleuræ with strong bristles; posterior margin of the first segment of the abdomen ♂♀ straight, not medially gripping the second segment; proboscis not lengthened. (South America.) ... *Pseudomilichia* Becker.

5. Head and thorax roughened, with fine pubescence; proboscis very long and geniculate. (South America.) .... *Ulia* Becker.

Head and thorax smooth, the hairs and bristles normal; proboscis normal. 6.

6. Four dorsocentrals; pubescence of mesonotum scattered and coarse. (South America.) .... *Eccoptomma* Becker.

One or two dorsocentrals; pubescence of mesonotum close and short. (Europe, Africa, New Guinea, Hawaii, North America, South America.) .... *Milichiella* Giglio-Tos.

7. Front narrow, nearly three times as long as the width above, with about eleven pairs of uniform fronto-orbitals; first vein ends near the middle of the wing; third and fourth veins converging so as almost to close the first posterior cell; three humeral bristles, one presutural, two small dorsocentrals placed well back; costa almost bare; calypteres rather large, the upper one delicately ciliate; head large, hemispherical, cheeks very narrow, no vibrissal angle; proboscis very long, slender and geniculate; eyes bare. (North America.) . .*Eusiphona* Coquillett.

Front relatively broader, never with many large fronto-orbitals; first vein ends nearer base of the wing; first posterior cell never markedly narrowed; calypteres rudimentary..............................8.

8. Hairy, almost bristleless, no vibrissæ, fronto-orbitals or scutellars; front, eyes, mesonotum and pleuræ hairy; front below ocelli over twice as long as wide; cheeks one sixth the eye-height; proboscis short and robust. (North America.)..................*Arctobiella* Coquillett.

Not densely hairy species, macrochætæ differentiated; front transverse or quadrate (rarely, *e. g., Platophrymyia, Leptometopa*), longer than wide ....9.

9. Proboscis long, chitinized and geniculate, the outer portion folding back; vibrissal angle of cheeks usually distinct.......................10.

Proboscis very short, fleshy, the labella not strongly geniculate, nor constructed for piercing; oral margin not or scarcely projecting, usually several vibrissæ in an oblique row in front.......................22.

10. Arista thickened; third antennal joint small; front square; palpi linear, long and porrect; bristles strong, a presutural and a dorsocentral present in front of the suture; costa not bristly, stopping at the third vein. (North America.).....................*Aldrichiella* Hendel.

Arista slender; front usually transverse; palpi more or less clavate; mesonotum rarely bristly in front of the suture......................11.

11. Posterior crossvein and anal cell entirely wanting, the anterior crossvein located much before the end of the first vein, the costa stopping at the third vein; cheeks narrow; palpi slender; tibiæ slender.......12.

Posterior crossvein present, the anterior crossvein opposite or beyond the end of the first vein; anal cell usually present.................13.

12. Face with a prominent central nasiform projection; antennæ rather long, arista bare; one presutural, mesopleural bristles present. (Africa.) *Risa* Becker.

Face deeply concave; antennæ short, the third antennal joint large, orbicular, the arista pubescent; no mesopleural bristles. (North America.) *Paramyia* Williston.

13. Tibiæ, especially the hind pair, compressed, explanate, and more or less clavate, particularly in the male; costa extends to the fourth vein. .14.

Tibiæ not compressed and clavate in either sex; palpi large, porrect...17.

14. Head horizontally longer than high, the entire under side horizontally straight; front longer than wide; pteropleuræ with bristles; third and

fourth veins convergent, ending at wing-tip; base of costa not bristly; palpi elongate. (Africa.).....................*Leptometopa* Becker.

Head higher than long, the lower side not entirely horizontal; front not narrowed; first posterior cell not narrowed, ending beyond the wing-tip; palpi short and broad.................................15.

15. Antennæ broadly separated by the large carinate lunule; oral margin retracted; base of costa not bristly; pteropleural bristle present. (Asia.) *Hypaspistomyia* Hendel.

Antennal grooves confluent, the lunule not large; vibrissal angle prominent ....16.

16. Base of costa furnished with bristly hairs; whole body opaque; cruciate bristles of front strong and usually on evident stripes; the two upper fronto-orbitals bent outward. (Europe, Asia, Africa, North America.) *Desmometopa* Loew.

Base of costa not bristly; body polished; cruciate bristles delicate, of the upper fronto-orbitals the anterior is proclinate, the other reclinate. (Europe, North America.)........................*Madiza* Fallen.

17. Under side of head long, straight, horizontal, the epistome projecting; front narrowed, with a longitudinal depression on each side; face carinate; abdomen pruinose; anterior dorsocentrals absent. (North America.)..............................*Platophrymyia* Williston.

Under side of head rounded, not entirely horizontal; front quadrate; abdomen not pruinose; palpi greatly compressed................18.

18. Four strong dorsocentrals and one presutural present; third antennal joint very large, in the male quadrate; arista loosely pubescent; eyes hairy; three upper fronto-orbitals; scutellar bristles diverging; palpi bristly; dark pollinose species. (Europe, North America.) *Phyllomyza* Fallen.

Anterior dorsocentrals rarely present; eyes nearly or quite bare; palpi not markedly bristly; shining or subshining species..................19.

19. Anterior fronto-orbitals wanting, leaving only the upper three; apical scutellars converging; antennæ normal.............................20.

About six pairs of fronto-orbitals descending quite to the antennæ, the lower set converging; proboscis slender, the part folding back as long as the middle portion; one or two dorsocentrals; no mesopleural bristle ....21.

20. One dorsocentral and one pair prescutellars on the same transverse line, two supra-alars, one sternopleural; the upper fronto-orbitals on a line with the posterior ocelli, the second a little above the middle of the distance between the lower ocellus and the antennæ, the lowest immediately below the second and proclinate; cheeks narrow. (Europe, North America.)..........................*Cacoxenus* Loew.

One anterior and three posterior dorsocentrals, three rows of acrostichals, no prescutellar, three weak supra-alar and one intra-alar; no sternopleural, one weak and one strong mesopleural; the three uniformly

spaced reclinate fronto-orbitals descend below the middle of the front; cheeks one third the eye-height; anal and second basal cells wanting, alula wanting (?), base of costa with bristly hairs; ovipositor large, broadly oval; labella fleshy and short. (Europe.)
Pseudopomyza Strobl.

21. Third antennal joint not large; three upper fronto-orbitals; bristles long, the apical scutellars diverging; middle and hind femora slightly enlarged; palpi greatly compressed, bare except for a few bristles on lower edge and at tip; base of costa with short fine hairs, the sections of the fourth vein 1:3; eyes round; testaceous species. (North America.) ....*Stomosis* n. g.

Third antennal joint very large, in the male quadrate and woolly-pubescent; two or three upper fronto-orbitals; scutellars converging; femora not incrassate; base of costa with short bristly hairs, the penultimate section of the fourth vein less than one third the length of the ultimate; eyes vertically lengthened; black species. (North America.)
Neophyllomyza n. g.

22. Wings rudimentary, scarcely longer than the scutellum; abdomen broadly swollen; one oral vibrissa; antennæ lying in a deep facial groove; mesonotum without discal macrochætæ. Parasitic on birds. (Europe.) (See: Collin, Nov. Zool., 18, 138 (1911).)...........*Carnus* Nitzsch.

Wings normal, longer than the abdomen; abdomen not swollen; not parasitic ....23.

23. Second, third and fourth veins curving forward, ending before the tip of the wing; posterior crossvein beyond the middle of the wing; costa reaching the fourth vein; scutellum large, with lateral spinous tubercles near the apex, the apical scutellar bristles diverging; mesonotum punctulate, pleuræ smooth; cheeks very narrow. (Africa.)
Rhodesiella Adams.

Fourth vein ends beyond the wing-tip; scutellum normal, the apical bristles cruciate; mesonotum not punctulate; mesopleural bristles present; cheeks comparatively broad....................................24.

24. Costa continuing to the fourth vein; posterior crossvein much beyond the end of the first vein, the penultimate section of the fourth vein longer than the ultimate section of the fifth; costa not bristly; face strongly carinate; postverticals parallel; one pair of interfrontal cruciate bristles; anterior dorsocentral present. (North America.) .*Paramadiza* n. g.

Costa evanescent beyond the third vein; discal cell minute, the penultimate section of the fourth vein about one fourth the length of the ultimate section of the fifth vein...............................25.

25. Entire costa with well-separated bristles; second and third veins converging; center of the front with many rough hairs; face with a hemispherical subantennal depression; anterior dorsocentral present; tibiæ compressed. (Asia.)......................*Horaismoptera* Hendel.

Costa not spinose, but pectinate with stiff bristles up to the end of the first vein; third vein ending at the wing-tip, not converging with the second vein; one pair of interfrontal cruciate bristles; face with two subantennal depressions and carinate medially between them; anterior dorsocentral wanting; postverticals parallel. (Europe, Africa, North America.) .... *Meoneura* Rondani.

PHOLEOMYIA Bilimek.

Three evident dorsocentrals; thorax nearly matte brownish black; abdomen of male not silvery .... 2.

One or two evident dorsocentrals; abdomen of male more or less silvery white .... 3.

2. Sides of front nearly parallel, the width of the front at the antennæ equal to the length of an antenna; abdomen concolorous with the thorax or slightly more shining. 4 mm. (W. Ind., N. H., Mass.,* Ct., Pa.,* N. J., Fla.,* Ga.,* Nebr., Id.*) (*Milichia.*) .... *indecora* Loew.

Front greatly narrowed toward the antennæ so that its least breadth is but little more than one-half the length of an antenna; abdomen with a dull red silky sheen. 4 mm. (Hayti.) .... *myopa* n. sp.

3. All the segments except the first of the male abdomen silvery .... 4.

At least two segments of the male abdomen not silvery .... 5.

4. Second segment of the male abdomen longer than the third and fourth together. 3 mm. (W. Ind., Ga.) (*Milichia.*) .... *leucogastra* Loew.

Abdominal segments of uniform size. (Ga.*) (Ann. Mus. Nat. Hung., V, 524, 1907: *Rhynchomilichia.*) .... *leucogastra* var. *dispar* Becker.

5. Second segment of the male abdomen with a median crescentic blackish spot on the silvery ground, the third and fourth segments wholly silvery. 3 mm. (Hendel: Wien. ent. Ztg., XXX, 40, figs. 5–7, 1911.) (S. Am., Mex.) .... *leucozona* Bilimek.

Second segment black, the third and fourth not wholly silvery .... 6.

6. Entire abdomen matte black, only the fifth segment with two silvery lateral spots. 2.5 mm. (Ga.) (Ann. Mus. Nat. Hung., V, 524, 1907.) (*Rhynchomilichia.*) .... *pseudodecora* Becker.

First and second segments entirely black, the front of the third, fourth and fifth segments with silvery fasciæ, that of the fifth segment interrupted. 2 mm. (Fla.) (*Milichia.*) .... *robertsoni* Coquillett.

Pholeomyia myopa new species.

Male.—Very close to *indecora* Loew, but differing in the structure of the head. The eyes are larger, encroaching on the front and face, the facets are larger, requiring about five to measure the width of the third antennal joint, whereas in *indecora* about six facets span the same distance. The front is conspicuously but uniformly narrowed toward the antennæ, where it is much narrower than the length of an antenna. The ocelli are close together and small, the ocellar triangle smaller than the third antennal joint. The cruciate bristles are greatly reduced, but three distantly spaced pairs of insignificant hairs remaining. The lunule is highly arched, and notched at its summit. The face is correspondingly narrowed, and is provided with a median seam, which is lacking in *indecora*. The crowding of the face raises the oral bristles, which ascend fully half way to the antennæ. The palpi are bristly. In *indecora* the palpi are almost devoid of bristles and the oral vibrissæ do not extend half way to the antennæ. Furthermore, the abdomen of the present species is silky, with a distinct red sheen.

One specimen. Hayti.

MILICHIELLA Giglio-Tos.

Mesonotum gray pruinose, with five vittæ, of which the median one extends almost across the scutellum; abdomen brownish, somewhat shining; one dorsocentral; palpi white. 1.5 mm. (Porto Rico.) (*Ophthalmomyia.*) ....*cinerea* Coquillett.

Shining black species; thorax devoid of pollen; usually two dorsocentrals...2.

2. Palpi red, only the tip blackened; lunule, root of antennæ, knees and tarsi brownish; abdomen of male and female black. 3–4.5 mm. (Cal.*) (Wien. ent. Ztg., XXX, 39, 1911.)...................*nitida* Hendel.

Palpi, lunule, legs, etc., black.......................................3.

3. Upper side of abdomen of male entirely silvery. 2.5 mm. (N. Y., Ont.,* N. J., Fla., Ga.,* Kans.) (*Milichia: Lobioptera.*).....*arcuata* Loew.

Abdomen of male and female mostly or wholly black..................4.

4. Second segment of male abdomen with a lateral silvery spot. 3.25 mm. (N. J.*).......................................*bisignata* n. sp.

Abdomen wholly without silvery markings...........................5.

5. Wings milky, veins white, first posterior cell almost closed in the margin. 2.5–3 mm. (Afr.; E. Ind.; W. Ind.;* Hawaii; S. Am.; N. J., D. C., Fla., Ga.,* Tex.,* N. Mex., Kans.) (*Ophthalmomyia.*) *lacteipennis* Loew.

Wings hyaline, first vein heavy and brown, a dark spot at the tip of the costal cell, first posterior cell narrowed but not nearly closed at its apex. 3 mm. (Cal.) (1 Rept. Laguna Marine Lab., 162, fig. 94, 1912.) ....*nigrella* Cole.

Milichiella bisignata new species.

Male.—Length 3.25 mm. Vertex a little wider than one third the head; third antennal joint with gray spongy pubescence, slightly reddish in ground color on the sides at the base; lunule black; about six vibrissæ; palpi black. Mesonotum glistening black; scutellum shining black; knob of halteres yellow. The four basal segments of the abdomen overlaid with brown dust except as follows: the extreme sides of the first segment, the broad sides of the second, the apical angles of the third and fourth. The extreme base of the fifth segment is similarly dusted, the remainder polished black. The apical angles of the second segment filled with a transverse silvery spot, the anterior margin of which is round. Legs black. Calypteres pure white. Wings hyaline, veins pale yellow, but a brown spot near the end of the first vein; third vein straight, the fourth vein curving forward so that the apex of the first posterior cell is one third as wide as the end of the submarginal cell.

I have two specimens before me, received from Professor Aldrich. These were collected by Mr. C. W. Johnson at Riverton, New Jersey, and bear date of July 4. The name *bisignata* is a manuscript name given by Mr. Coquillett to this species and has been used in the New Jersey Lists.

EUSIPHONA Coquillett.

Dull black, including the antennæ, palpi, halteres and legs, the tarsi infuscated; the face and genæ white-pruinose, and when viewed from in front the whole front between the narrow orbits is golden pruinose, leaving the elongate narrow ocellar triangle black; wings very faintly smoky. 5 mm. (Vt.,* N. J., Ill.,* Col.) .... *mira* Coquillett.

ARCTOBIELLA Coquillett.

Black, including the halteres, the body opaque, somewhat velvety; wings pale brownish, the anterior crossvein near the middle of the discal cell. 4 mm. (B. C.) .... *obscura* Coquillett.

ALDRICHIELLA Hendel.

Testaceous, the antennæ reddish with black arista, palpi yellow, proboscis black; a dark spot above the neck on the occiput and thorax, mesonotum reddish, scutellum, pleuræ and venter yellow, tergites black, but the sides of the abdomen becoming increasingly yellow towards the anus; metanotum and a spot at the base of the hind coxæ black; halteres yellow, wings hyaline. 2.5 mm. (S. Dak.*) (Wien. ent. Ztg., XXX, 37, 1911.) .... *agromyzina* Hendel.

PARAMYIA Williston.

Shining black, the front with a dull stripe on each side of the elongate ocellar triangle; halteres, knees, front tibiæ and the tarsi brown; postverticals long, cruciate, one sternopleural; palpi long, straight and porrect; both the upper divergent and the lower convergent fronto-orbital bristles present. 2 mm. (Pa., Ga.,* W. Ind.) (*Nigra* Williston.) (*Phyllomyza.*) .... *nitens* Loew.

DESMOMETOPA Loew.

The interfrontal cross-bristles located on evident stripes which form a letter M on the black front..2.

The cross-bristles are not located on specialized stripes; front red anteriorly; cheeks, palpi and halteres yellow; front tibiæ with two narrow pale rings, tarsi annulate; hind ~~femora~~ tibiæ of male strongly explanate. (Eur.; Ont.; Mass.,* Pa.,* N. J., Ill.,* Tex.,* S. Dak., Ala., Wash.*) *latipes* Meigen.

2. Halteres black; palpi and legs wholly black; entire insect black. (Eur.;* Id., Wash.,* B. C.*)..............................*sordidum* Fallen.

Halteres pale ....3.

3. Palpi wholly black; tarsi more or less reddish; cheeks black, narrow, the pollinose lower edge delimited from the polished upper part by a waving line. (Africa; Asia; Cuba; Ga.,* Mass.,* Tex.*) . *tarsalis* Loew.

Palpi yellow at the base and black at the end; tarsi black; cheeks one third the eye-height, the pollinose lower portion with biangulate margin. (Eur.; Afr.; Mass.,* N. J.) ....*m-nigrum* Zetterstedt.

MADIZA Fallen.

Polished black, including the halteres, the abdomen very lightly dusted; lunule, palpi and posterior tarsi yellowish; wings whitish hyaline, veins pale yellow. 2 mm. (W. Ind.; Mass.,* N. Y.,* N. J., Ill.,* Fla., Tex.,* Col.,* Wyom.,* N. Mex., Id., Wash.,* B. C.*) (*Desmometopa.*) *halteralis* Coquillett.

PLATOPHRYMYIA Williston.

I strongly suspect that this genus and *Leptometopa* Becker are the same. The narrowed first posterior cell, the pruinose abdomen, the whitish wings, the narrowed front, and the long horizontal oral margin are suggestive of the synonymy. The strikingly explanate hind tibiæ of *Leptometopa* are characteristic of the males alone. It is possible either that the West Indian species is not so formed, in which case the two are different genera, or that the description of *Platophrymyia* was drawn up from a female. Williston states that the legs are short and rather strong, a description that characterizes the female of *Leptometopa*. I have specimens of *Leptometopa* from Cape Colony, South Africa.

Black, including the antennæ and palpi; thorax lightly cinereous, abdomen pruinose; halteres yellow; metatarsi yellowish; wings whitish-hyaline. 2 mm. (W. Ind.)..............................*nigra* Williston.

PHYLLOMYZA Fallen.

Dull black, the halteres, tarsi and more or less of the tibiæ brown; wings cinereous hyaline; interfrontal setulæ continuing to the lunule; third antennal joint of female orbicular, of male very large, quadrate and sericeous-pubescent; face of male greatly excised in profile. 2.5 mm. (Eur.;* N. J.) ....*securicornis* Fallen.

CACOXENUS Loew.

Head and thorax blackish, but overlaid with opaque yellow pollen; legs, abdomen and scutellum yellow, the base of the scutellum merging with the color of the mesonotum; wings hyaline, with yellow veins. 2 mm. (Cuba.) ....*semiluteus* Loew.

STOMOSIS new genus.

Postverticals long, cruciate; ocellars distant from each other the width of the front ocellus; interfrontal hairs very few, a pair of converging hairs at the middle of the front; three upper diverging fronto-orbitals; buccal ridge with a row of small bristles diminishing in size toward the occiput; lowermost occiput with three oral bristles. Proboscis long, slender, rigid, geniculate at the middle; palpi elongate, spatulate, strongly compressed, bristly along edge at tip. Third joint of antennæ rounded, orbicular, incumbent on the face; arista one and one half times the length of the antennæ, short-pubescent with fine and rather close hairs. Eyes rounded, the cheeks one sixth the eye-height; vibrissal angle moderately prominent; face much excised in profile; genæ greatly attenuated along the middle of the face. One humeral, two notopleural, one presutural, one supra-alar, two intra-alar, two approximate dorsocentrals, six rows of acrostichals; the apical scutellars very long and diverging; one posterior sternopleural. Legs rather stout, front femora with bristles, no preapical tibial bristles. Costa continuing to the fourth vein; before the first vein the costa has short, fine hairs; second, third and fourth veins parallel; sections of fourth vein proportioned about one to three, the penultimate section slightly longer than the ultimate section of the fifth vein.

Type: *Stomosis* (*Desmometopa*) *luteola* Coquillett.

Testaceous, including the antennæ, halteres and legs, the abdomen a little brownish; a brownish line extends along the upper edge of the sternopleura; arista and bristles black; wings hyaline, veins yellowish. 2 mm. (Ariz., Tex.*) ....*luteola* Coquillett.

NEOPHYLLOMYZA new genus.

Postverticals converging; paired cruciate bristles present along the middle of the front; fronto-orbital bristles extending quite to the antennæ, the upper ones diverging, the lower converging. Face excavated, cheeks narrow, the vibrissal angle prominent, oral vibrissæ large; eyes vertically lengthened. Antennæ large, of the male greatly enlarged, the arista slender, short-pubescent, the hairs dense or loose. Proboscis long, slender, geniculate; palpi enlarged, compressed, porrect, bristly along the edge at the end.

One large dorsocentral, one humeral, two notopleural, one presutural, two supra-alar, acrostichal and other setulæ numerous and uniformly distributed; apical scutellar bristles long and converging; one sternopleural, no mesopleural bristles. Legs rather strong, setulose; pulvilli minute; no preapical tibial bristles. Costa attains the fourth vein, twice broken, towards the base ciliate with fine, small bristles and with a stronger humeral bristle before the first break; second, third and fourth veins parallel; crossveins approximate; fifth vein evanescent; second basal and anal cells rudimentary or incomplete.

Type: *Neophyllomyza quadricornis*, new species following.

TABLE OF SPECIES OF *Neophyllomyza*.

Submarginal cell narrowed at its extremity, its costal margin about one half that of the first posterior cell; penultimate section of the fourth vein less than one third as long as the ultimate section; knees, more or less of the tibiæ and all of the tarsi yellow; frontal orbits subshining; mesonotum shining; proboscis shorter than the head. 1.5 mm. (West Ind.) .... *magnipalpus* Williston.

Submarginal cell as broad as the first posterior cell at the extremity; at least the tibiæ black; proboscis longer than the head.................. 2.

2. Mesonotum polished black; orbits narrowly shining; penultimate section of the fourth vein one third as long as the ultimate section; anal cell rudimentary; tarsi yellow; halteres shining black. 2.25 mm. (Id.*) *nitens* n. sp.

Mesonotum sericeous black; front entirely sericeous; penultimate section of the fourth vein less than one fourth as long as the ultimate section; anal cell wanting; tarsi black or blackish; halteres blackish. 1.5 mm. (Id.,* Wash.,* N. Mex.,* La.*) .... *quadricornis* n. sp.

Neophyllomyza quadricornis new species.

Male.—Length 1.5 mm. Black, subshining. Front sericeous, the orbits, ocellar triangle and the stripes for the cruciate bristles not differentiated; two diverging upper and two converging lower fronto-orbitals; three pairs of cruciate bristles and an additional one above the base of each antenna; front broader than long, the frontal suture arched over each antenna. Face extraordinarily excavated to receive the large antennæ, the facial orbits obliterated; cheeks one tenth the eye-height. The third joint of the antennæ greatly enlarged, subquadrate, reaching quite to the oral margin, densely clothed with erect silky pubescence, the arista as long as the diagonal of this joint. Proboscis long, slender, the elbow extending much beyond the epistome; palpi porrect, compressed, subulate. Mesonotum subshining, almost sericeous; one large dorsocentral, setulæ numerous; pleuræ polished; abdomen subshining. Legs entirely black, at most the tarsi brownish. Halteres dull black; calypteres dusky, with a loose fringe. Wings hyaline, the veins black; the vein between the first and second basal cells wanting, anal cell entirely wanting; penultimate section of the fourth vein about one fifth as long as the ultimate section and about one half the length of the ultimate section of the fifth vein.

Female.—The female differs in the structure of the head. The third joint of the antennæ is much reduced in size, scarcely reaching the mouth and it is less quadrate, but is similarly pubescent; the arista is nearly two times the length of this joint. The face is less remarkably excavated.

Five males and two females from the Cedar Mountains of Idaho; Bellingham, Washington; Cloudcroft, New Mexico; and Opelousas, Louisiana.

Neophyllomyza nitens new species.

Female.—Length 2.25 mm. Polished jet black, the tarsi alone yellow; last antennal joint and palpi dull black, the front sericeous except the polished narrow orbits, ocellar triangle and the slender stripes bearing the cruciate bristles; the basal three segments of the abdomen lightly dusted. Front nearly square, the uppermost frontal bristle inclinate, the next two divergent, the lowermost two convergent, between the lowermost two is a pair of minute convergent bristles; five pairs of cruciate setulæ; postverticals large. Arista microscopically pubescent, about six times as long as the third antennal joint. Palpi very broad; elbow of proboscis not reaching beyond the epistome. One dorsocentral; mesopleuræ closely fine-hairy and not setulose; one sternopleural. Calypteres minute but with numerous cilia. Halteres black, the knob polished. Wings hyaline; penultimate segment of the fourth vein about one third as long as the ultimate segment and equal to the ultimate segment of the fifth, which is evanescent at the end; second basal and anal cells minute, barely formed.

One specimen, Avon, Idaho, July 26, 1912.

PARAMADIZA new genus.

Front below the ocelli quadrate, one third broader than long; ocellar triangle large, reaching nearly to the frontal suture, before its apex a single pair of cruciate bristles; four fronto-orbital bristles, the lower two convergent, the upper two divergent; postverticals approximate and parallel, strong; frontal suture transversely bisinuate. Face nearly vertical, with two large deep subantennal depressions and strongly carinate medially, the epistome slightly projecting. Cheeks one fourth the eye-height, the vibrissal angle rounded-rectangular; occiput obliquely descending to the vibrissal angle, its ridge with a row of strong bristles; two strong and one weak vibrissæ along the front of the small bucca; eyes rounded, longest vertically. Antennæ small, reaching two thirds the distance to the oral margin, the arista about twice the length of the orbicular third joint, bare. Proboscis short, fleshy; the palpi clavate. Two humeral bristles; two notopleural, one presutural, two supra-alars, one intra-alar, three dorsocentrals in back and one in front of the suture, acrostichals sparse, four scutellars; one sternopleural, one lower and one postero-superior mesopleural in addition to the setulæ, no prothoracic bristles. Scutellum subtriangular, flat, bare. Abdomen with five segments plus the ovipositor, with sparse setulæ. Legs moderately stout, front femora bristly, posterior tibiæ with small apical spurs, but not at all compressed; pulvilli small. Calypteres rudimentary, bare. Costa continuing to the fourth vein, broken beyond the humeral crossvein and before the end of the first vein, at the latter place with two stout bristles and at the humeral break with one similar bristle, base of the costa with two long and strong bristles, costa otherwise not bristly; third vein diverging from the second so as to end at the wing tip; discal cell long, posterior crossvein beyond the middle of the wing and anterior crossvein much beyond the second costal break, the penultimate section of the fourth vein nearly one half as long as the ultimate section and longer than the ultimate section of the fifth vein; basal cells small but evident, the anal vein reaching half way to the margin.

Type species: *Paramadiza washingtona,* new species following.

Paramadiza washingtona new species.

Female.—Length 2.75 mm. Shining black, thorax with sparse hair and fine but long dorsocentrals. Antennæ, palpi and proboscis black; front shining. Tarsi brown. Halteres and calypteres yellow. Wings hyaline, with slight whitish tinge, veins yellowish, their roots paler.

One specimen, Wawawai, Washington.

While this species superficially resembles *Madiza halteralis,* it is very different.

MEONEURA Rondani.

Shining black; the ocellar triangle large, polished, black, the remainder of the front sericeous and often red; a single pair of cruciate bristles, located near the antennæ; postverticals close together and parallel; cheeks sometimes reddish in front; mesonotum very lightly dusted; knob of halteres white; fourth vein very weak, the two crossveins very close together. 1 mm. (Eur.; Alaska,* Id.,* Wash.*) (*Agromyza lacteipennis* Fallen.) .... *vagans* Fallen.

Subfamily AGROMYZINÆ.

Table of the Genera.

Arista completely wanting, the third antennal joint large; front shining and closely hairy, no fronto-orbital bristles or oral vibrissæ; eyes large, microscopically pubescent, the cheeks linear; mesonotum close-hairy, bristleless; no sternopleurals, mesopleuræ setulose; scutellum large, triangular, with sharp edge and with two minute apical bristles; legs without spurs or bristles; calypter rudimentary, not ciliate; wings short and broad, the costa extending to the third vein, the second basal fused with the discal cell; auxiliary vein parallel with the first vein, the costa twice broken. (Europe, Africa, Australia, North America.) .... *Cryptochætum* Rondani.

Arista present; front rarely shining, rarely pubescent, and always with fronto-orbital bristles present; vibrissæ present; eyes rarely hairy, smaller, the cheeks broader; mesonotum, scutellum and pleuræ provided with macrochætæ; scutellum with rounded edge; tibiæ with apical spurs; calypteres ciliate; wings with the second basal usually distinct from the discal cell, but sometimes fused with the first basal; the costa broken only at the end of the auxiliary vein .... 2.

2. Ocellar triangle placed forward on the front, the front usually produced, more or less cone-like, and pubescent; arista pubescent to short-plumose; tibiæ with preapical bristle; mesopleuræ bare; wings pictured, irrorate or fasciate. (North and South America.) *Traginops* Coquillett.

Ocelli placed on the vertex, the front not produced; arista short-pubescent or bare; wings at most with small dark spots....................3.

3. Third antennal joint ovate but with a sharpened end, the arista somewhat thickened; two scutellar bristles. (Europe, Asia, North America.) *Cerodonta* Rondani.

Third antennal joint not ending in a blunt point; four scutellar bristles present ....4.

4. Cheeks but one sixth the eye-height; two fronto-orbitals; face strongly convex; antennæ scarcely one sixth as long as the head; vibrissæ inserted distinctly above the front border of the oral margin. (North America.) ....*Hemeromyia* Coquillett.

Cheeks broader; three or more fronto-orbitals; face not convex........5.

5. Costa extending to the fourth vein, which is as strong as the third; cheeks receding; wings unspotted; femora not thickened; chætotaxy variable ....6.

Costa extending to third vein only................................8.

6. Posterior crossvein wanting; second, third and fourth veins close together, ending before the tip of the wing, the fifth vein greatly diverging from the fourth. (North America.)................*Antineura* n. g.

Posterior crossvein present; the fourth vein ending beyond the tip of the wing, the fifth vein not greatly diverging.......................7.

7. Ovipositor wedge-shaped, short. (Europe, Asia, Australia, Africa, North America.) ....*Agromyza* Fallen.

Ovipositor tube-like, elongate. (Europe, North America.) .*Liriomyza* Mik.

8. Anterior crossvein situated near the base of the wing, the posterior crossvein wanting, or else very close to the anterior; fourth and fifth veins weak, the third vein ending far before the wing-tip; auxiliary vein usually parallel with the first vein.........................9.

Anterior crossvein situated nearly opposite the end of the first vein; posterior crossvein present, and always some distance from the anterior; third vein ending near the wing-tip, the fourth and fifth veins not weaker than the second and third.............................10.

9. Posterior crossvein entirely wanting. (Europe, Asia, Africa, North America.) *Phytomyza* Fallen.

Posterior crossvein present, the discal cell minute. (Europe, North America.) *Napomyza* Haliday.

10. Hind femora more or less incrassate; vibrissal angle of cheeks prominent; lower occiput reaching forward and bristly; wings usually spotted, at least at the end of the first vein..............................11.

Hind femora not thickened; cheeks receding, the occiput descending straight down; wings not spotted. (Europe, Africa, North America.) *Domomyza* Rondani.

11. Mesopleuræ not hairy; postverticals strong; four or five dorsocentrals; two intra-alars; no preapical tibial spurs; femora yellow with preapical spot. (Europe, North America.)............*Odinia* Desvoidy.

Mesopleuræ hairy and with two bristles; no postverticals; four dorsocentrals; one intra-alar; preapical bristle of tibiæ present; femora black. (Europe.) .... *Neoalticomerus* Hendel.

CRYPTOCHÆTUM Rondani.

The genus *Cryptochætum* is anomalous in any group. The following species were originally described as *Lestophonus,* as a genus of the Oscinidæ. The humeral break of the costa, as well as other characters, suggests the Milichiinæ, but the postverticals are divergent, as in the Agromyzinæ alone. The postverticals are inconspicuous among the erect, short, stiff hairs of the vertex, but can be differentiated as a pair of divergent hairs immediately behind the ocellar triangle.

Penultimate section of the fourth vein one half the length of the ultimate section; fourth and fifth veins not weakened; face, front, mesonotum and scutellum deep blue, rather shining; abdomen shining blue-green; antennæ black, legs blackish; wings grayish hyaline, veins dark brown. 1.5 mm. (Australia, introduced into California.) .... *iceryæ* Williston.

Crossveins closer together; fourth and fifth veins slender beyond the crossvein; otherwise as in the preceding species. (Australia, doubtfully introduced into California.) .... *monophlebi* Skuse.

TRAGINOPS Coquillett.

Arista almost bare; lunule white, unspotted; sides of front cinereous, with setigerous black spots; thorax similarly spotted, pleuræ bivittate, abdomen brown, spotted; legs yellow, the base of the femora and two rings on the tibiæ brown; halteres yellow; wings hyaline, with numerous rounded brown spots. (Ga., N. J.) .... *irrorata* Coquillett.

ODINIA Desvoidy.

Bristles of front and mesonotum arising from brown dots, hairs of notum and abdomen arising from smaller brown dots; front and hind femora with subapical spot; tibiæ with median and apical black rings; wings reticulate with brown. 4.3 mm. (Ga.) .... *picta* Loew.

Body cinereous, not with setigerous spots; wings not reticulate .... 2.

2. Wings immaculate; tibiæ brown; sternopleura and a spot above it brown; disk of mesonotum without acrostichal setulæ; abdomen dark brown. 1.5 mm. (N. H.) .... *immaculata* Coquillett.

Acrostichals present; crossveins at least clouded; tibiæ with one or two rings; pleuræ bivittate; abdomen with paired spots .... 3.

3. Front pubescent, reddish above antennæ; acrostichals not seriately arranged, but eight to ten on the suture; both crossveins dark brown; fifth vein reaches the wing-margin. 4 mm. (Eur.; Mich.) ... *maculata* Meigen.

Front nearly or quite bare, usually entirely gray; acrostichals in evident rows, on the suture six rows; crossveins but little clouded; fifth vein scarcely reaches the wing-margin. 2 mm. (Eur.; Mich.)
boletina Zetterstedt.

CERODONTA Rondani.

Largely yellowish species, the disk of the mesonotum cinereous black, more or less marked with two paler vittæ and with a yellowish spot before the scutellum; pleuræ mostly yellow; scutellum yellow in the middle; legs yellow, the tarsi brownish. 2 mm. (Mass.,* N. H., D. C., N. J., W. Ind., La.,* Ind., Ill.,* Tex.*) (*Ceratomyza.*)......*dorsalis* Loew.

Mostly black; the mesonotum subshining black to the black scutellum, not vittate; pleuræ mostly black; legs black or blackish, the femora more or less yellow. 2.5 mm. (Eur.;* Mont.,* Wyom.,* Id.,* Wash.,* B. C.,* Ore.,* Cal.*)..........................*femoralis* Meigen.

HEMEROMYIA Coquillett.

Black, the face and cheeks yellow, the antennæ, palpi and halteres brownish; ocellar triangle and the orbits slightly polished; four dorsocentrals; sections of the fifth vein proportioned one to five, the anterior crossvein at three fourths the length of the discal cell. 1.5 mm. (N. Mex.)
obscura Coquillett.

ANTINEURA new genus.

Related to *Agromyza,* but the discal cell is open outwardly. Four fronto-orbitals, the lower three convergent; cheeks receding, about one third as deep as the eye-height; proboscis short and fleshy; arista bare, a little more than twice the length of the third antennal joint, its basal segment thickened. Mesonotum pollinose or shining; one anterior and three posterior dorsocentrals, two rows of sparse acrostichals; four scutellars; one sternopleural; two mesopleurals. Costa continuing to the fourth vein, broken only at the end of the first vein; the auxiliary vein rudimentary, confluent with the first vein along the middle of its course; second, third and fourth veins equally strong, parallel, located in the anterior part of the wing, the fourth vein ending before the wing tip; posterior crossvein entirely wanting, the anterior crossvein before the costal break; the vein between the first and second basal cells weak; only the base of the anal vein evident; the fifth vein gently curved, diverging from the fourth and ending at the middle of the hind margin of the wing, gradually evanescent, but its base as strong as the other longitudinal veins.

Type species: *Antineura togata,* following.

TABLE OF SPECIES OF *Antineura*.

Mesonotum, except the notopleural suture, pleuræ and abdomen entirely shining black; legs black except the knees. 1.2 mm. (Wash.*) *chlamydata* n. sp.

Mesonotum, pleuræ and abdomen more or less yellow, the mesonotum pollinose; legs largely yellow.......................................2.

2. Largely yellow, the mesonotum, except the sides and hind margin black, center of sternopleuræ and bases of abdominal segments brownish. 1.5 mm. (N. Mex.) (*Phytomyza.*)..............*palliata* Coquillett.

Largely black, the sides and posterior angles of the mesonotum, the sides of the scutellum and the abdominal segments, except their outer margin, yellow; most of the pleuræ blackish. 1.2 mm. (Wash.)..*togata* n. sp.

Antineura chlamydata new species.

Male.—Length 1.2 mm. Black, the front and vertex, except the ocellar triangle, the face, cheeks, antennæ, notopleural suture and the halteres yellow. Clypeus black, the balance of the mouthparts yellowish. Cheeks about one fourth as deep as the eye-height, but broader behind. Mesonotum highly polished, jet black, the humeri and a rather broad extension above the notopleural suture towards the root of the wings yellow, the posterior angles black like the notum; middle of scutellum broadly yellow, pleuræ black. Abdomen entirely shining black, hairy. Legs black, the knees a little brownish. Halteres yellow. Wings hyaline.

One specimen, Oroville, Washington, May 1, 1912.

Antineura togata new species.

Length 1.2 mm. Head yellow, the occiput, ocellar triangle, clypeus and arista blackish, proboscis, palpi and antennæ yellow. Mesonotum opaque cinereous black, the sides and posterior angles yellow; middle of scutellum yellow; pleuræ blackish in ground color, but the sutures and an oblique line crossing the mesopleuræ broadly yellow. Abdomen subshining black, the hind margins of the segments bright yellow, the fifth segment largely yellow; in the female the very short sixth segment is yellow and the seventh segment is elongate, round-triangular, polished jet black and with four long marginal bristles. In the male apparently the sixth segment terminates the abdomen, and is rounded, microscopically pubescent and of the same piceous black color as the bases of the other segments. Legs of the female yellow except the dusky tarsi; of the male the tibiæ and tarsi are infuscated. Halteres pale yellow; wings hyaline.

One male, Pullman, Washington, May 12, 1912; and one female, Almota, Washington, June 24, 1911.

Agromyza Fallen.

TABLE OF THE SPECIES OF *Agromyza* Fallen, INCLUSIVE OF *Domomyza* Rondani AND *Liriomyza* Mik.

Halteres black; black or metallic species; ocellar triangle elongate and polished; frontal orbits polished; auxiliary vein ending in or close to the first vein...2.

Halteres whitish or yellow; ocellar triangle small and opaque; frontal orbits usually not differentiated; auxiliary vein usually ending independently in the costa...15.

2. Calypter and its hairs white; metallic species..........................3.

Calypter margined with black, its hairs dusky........................6.

3. Lower part of face in profile receding; veins black; the fourth vein diverging from the third..4.

Lower part of the face projecting; veins subfuscous; fourth vein straight. (Pa.,* Mass.,* N. J.,* Ont., Ill.,* Ga., La.,* Tex.,* Wyom.,* Cal., Id.) *virens* Loew.

4. Costa evanescent beyond the tip of the third vein; wings broad; cheeks broad. (Wash.*).......................(*Domomyza*) *tamia* n. sp.

Costa reaching the fourth vein; wings normal; cheeks narrow. (*æneiventris* Fallen.) ....5.

5. Last two segments of the fourth vein proportioned 1 : 3; the fourth vein ends beyond the wing-tip; the segments of the fifth vein 3 : 2. (Eur.;* N. Y.,* N. J., W. Ind., Ga., N. Mex., Cal.,* Id.,* Wash.*) *æneiventris* Fallen, sens. str.

Segments of the fourth vein proportioned 1 : 4; the fourth vein less divergent from the third; segments of the fifth vein 1 : 1. (Eur.;* Cal.,* Wash.*) ....*æneiventris* var. *cunctans* Meigen.

6. Metallic species; segments of fourth vein 1 : 3; segments of the fifth vein 3 : 2; face not receding. (Eur.;* Id.,* Wash.*)..*pseudocunctans* Strobl.

Shining black species; segments of the fourth vein proportioned 1 : 4 to 1 : 8 ....7.

7. Sixth vein very evident and reaching nearly to the margin of the wing. (Eur., Afr., Asia; Mass.).......................*schineri* Giraud.

Sixth vein not very evident, and always abbreviated..................8.

8. Male with a conspicuous curved tapering bunch of oral vibrissæ; lower angle of the face of ♂♀ conspicuously produced; four frontal bristles; pubescence of frontal orbits sparse and inconspicuous; face subtuberculate between the antennæ. (Eur.;* Mass.,* Ill.,* La.,* Id.,* Wash.*) ....*curvipalpis* Zetterstedt.

Oral vibrissæ but one or two in number and not bunched; vibrissal angle not produced ....9.

9. Middle tibiæ with two bristles on the extensor side; no vibrissal angle to the face; front largely yellow; four fronto-orbitals; frontal orbits linear and nearly bare; arista five times as long as the third antennal

joint; seventh segment of ♀ abdomen depressed; auxiliary vein ending close to the end of the first vein, but independently in the costa; the sections of the fourth vein 1 : 4. 3 mm. (Hayti.*)...*diadema* n. sp.

Tibiæ without extensor bristles; face less receding; front black; the orbits broader; arista less than four times the length of the third joint; last segment of ♀ abdomen compressed; auxiliary vein ending in the first vein. (*maura* Meigen.) ....10.

10. Ocellar triangle longer than wide, its sides concave; the four lower frontal bristles close together, the fifth (uppermost) separated by a greater interval; sections of the fifth vein equal. (Proc. Ent. Soc. Wash., IX, 35 (1908).) (Mo., Que.,* Cal.).........*maura* var. *tiliæ* Couden.

Not with this combination of characters............................11.

11. Segments of the fifth vein 1 : 1; segments of fourth vein 1 : 10; tip of epistome sometimes visible in profile view; orbital pubescence very short, almost invisible; six frontal bristles; face carinate, its oral margin nearly straight. (Eur.; Ont., Ga.,* Pa., N. Y.,* N. J., Mass., Ill.*)....................................*maura* var. *simplex* Loew.

Basal sections of fifth vein longer than the apical section; crossveins less approximated; face receding or vertical, the lower angle rounded in profile; orbital pubescence usually dense and longer.............12.

12. Face short and strongly tuberculate between the antennæ, the epistome strongly emarginate; the lower two fronto-orbitals alone present; pubescence of frontal orbits very dense. (Eur.;* Id.,* Wash.*) *maura* var. *nasuta* n. var.

Face carinate, not shortened, the margin of the epistome less vaulted; the upper fronto-orbitals present; orbital pubescence less dense......13.

13. Seven fronto-orbital bristles; wings broadly rounded; segments of fourth vein 1 : 4. (Id.,* Wash.*)...........*maura* var. *setifrons* var. nov.

Four frontal bristles; segments of fourth vein 1 : 6 to 1 : 8...........14.

14. Third vein ending near the tip of the wing, nearer the second than the fourth vein; segments of fourth vein 1 : 6; sixth vein faint. (Eur.;* Id.,* Wash.*)..........................*maura* Meigen, sens. str.

Third vein equidistant from the second and fourth; the fourth vein ending nearer the tip of the wing; crossveins more approximated, the segments of the fourth vein 1 : 8; sixth vein usually wanting. (Eur.;* Wash.*) ....*maura* var. *morionella* Zetterstedt.

15. Thorax not bordered with yellow at the sides, at most a very narrow line present on the notopleural suture..............................16.

Thorax with distinct yellow lateral borders, extending more or less broadly along the notopleural suture....................................40.

16. Third antennal joint black..17.

Third antennal joint yellow or ferruginous..........................34.

17. Palpi black ....18.

Palpi yellow ....33.

18. Front, face and cheeks yellow, at most the upper orbits darkened......19.

Head wholly or mostly black; thorax at most lightly pruinose (if the frontal orbits are yellow compare *superciliosa*)..................22.

19. Notum and pleuræ pollinose, not shining; penultimate section of the fourth vein much shorter than the ultimate section of the fifth vein.....20.

Thorax shining, very lightly pollinose; legs entirely black; the penultimate section of the fourth vein nearly as long as the ultimate section of the fifth; four strong dorsocentrals; calypteres and fringe yellow; bristles of the head strong. 2 mm. (Mont.*).......*rutiliceps* n. sp.

20. Discal cell long and narrow, the anterior crossvein beyond the end of the first vein; knees sharply yellow; four strong dorsocentrals; five fronto-orbitals; fringe of calypteres blackish; wings slender, the veins strong. 2–3 mm. (Mont.,* Id.,* Wash.*)...........*genualis* n. sp.

Discal cell shorter; the anterior crossvein before the end of the first vein; legs entirely black.......................................21.

21. Dorsocentrals strong. 2 mm. (Ent. News, XXIII, 463 (1912).) (Ind.) *davisii* Walton.

Dorsocentrals weak, hardly longer than the notal setulæ; last segment of ♀ abdomen longer than the second, third and fourth segments together, compressed, jet black. 2 mm. (Col.,* Id.*).........*auriceps* n. sp.

22. Black, the abdomen especially greenish; two dorsocentrals; the segments of the fifth vein 3:2; anterior crossvein at one third the length of the discal cell. (D. C., Mass., Ga., W. Ind., Wisc., S. Dak.) *viridula* Coquillett.

No trace of metallic coloring; anterior crossvein near or beyond the middle of the discal cell ....23.

23. Large bristly species, usually with five strong frontal bristles and with one or two dorsocentrals before the suture; front very broad and uniformly opaque; calypteres dark, with bushy black fringe; antennæ brown at base; basal cells separate. (D. C., Mass.,* N. Y., Fla., W. Ind., La., Col., N. Mex., Cal.)....................*setosa* Loew.

Less bristly species, not more than four dorsocentrals; antennæ black; calypteres white ....24.

24. Costa interrupted at the third vein or much thinned between the third and fourth veins; mesonotum lightly pruinose and subshining; usually a small dorsocentral in front of the suture.......................25.

Costa continuing to the fourth vein; as far as known, the calypteres entirely white and fringed with white hairs; rarely with four dorsocentrals ....27.

25. Calypteres fringed with white hairs; costa entirely interrupted at the third vein. (*nigripes* Meigen.) 26

Calypteres fringed with white hairs; costa faint beyond the third vein; discal cell moderately large; sections of the fourth vein 1:3, of the fifth vein 3:2; front tibiæ and all the tarsi sometimes brownish. (Eur.;* Id.,* Wash.,* Ore.*).......................*reptans* Fallen.

26. Sections of fourth vein 1:3, of the fifth vein 3:2. (Eur.;* S. Dak.,* Wash.*)................*nigripes* var. *cinerascens* Macquart, Strobl.

Sections of the fourth vein 1 : 4, of the fifth vein subequal. (Eur.;* Col.*) *nigripes* Meigen, sens. str. Schiner.

27. Second section of the costa about three times as long as the third section; fourth vein diverging from the third and ending much beyond the wing-tip; discal cell large, the segments of the fifth vein 3 : 2; wings broad; third antennal joint very small, the arista long, slender and pubescent .... 28.

Second section of the costa about four times as long as the third section; arista short, stout at base, and apparently bare.................. 29.

28. Front broader, about one third the width of the head, brownish; abdomen black; frontal bristles fine. (D. C., N. J., Mass., Ont., Ill.,* Wisc.,* La.,* Kans., Tex.*).............................*parvicornis* Loew.

Front narrower, less than one third the width of the head, the frontal lunule with a rounded white spot; abdomen black, in the ♂ the last few segments yellowish; frontal bristles robust. (Pa., Mass.,* N. H., Fla., Ill.,* La.,* S. Dak.*).....................*terminalis* Coquillett.

29. Discal cell large, the segments of the fifth vein 3 : 2; fourth vein ending far beyond the wing-tip, its segments about 2 : 5; four dorsocentrals; thorax lightly pollinose. (Eur.;* Id.,* Wash.,* Ore.*)..*reptans* Fallen.

First section of the fifth vein not greatly longer than the outer section; tip of the wing near the middle of the first posterior cell, the third and fourth veins subparallel.................................... 30.

30. Discal cell smaller than usual, the basal section of the fifth vein much shorter than the outer section; the sections of the fourth vein about 1 : 5; root of the wing and the notopleural suture narrowly whitish; at least the front knees yellow................................ 31.

Basal section of the fifth vein longer than or subequal to the outer section; the sections of the fourth vein about 1 : 3...................... 32.

31. Scutellum broadly yellow in the middle; interfrontalia yellow. (Wash.*) *interfrontalis* n. sp.

Scutellum black; interfrontal sutures often striped with yellow above, but otherwise the front is black. (Eur.;* Mass.,* Id.,* Wash.*) *luctuosa* Meigen.

32. A narrow yellow sutural line along the sides of the thorax, expanding beneath the root of the wing; knees, front tibiæ and the tarsi more or less yellowish; frontal lunule white-pollinose; wings broader. (Pa., N. J., Mass.,* Wisc., Ill.,* La., Wash.*)..............*angulata* Loew.

Thorax not marked with a lateral yellow line; legs generally darker; front opaque black; wings narrower. (Nebr., Mass.,* D. C., Va., Fla., W. Ind., La., Tex., Ill.,* Wisc.,* S. Dak., Wash.,* Alaska.)..*neptis* Loew.

33. Front broader than long, black, but yellow below; antennæ entirely black; penultimate section of the fourth vein about one third as long as the ultimate section of the fifth vein. (W. Ind.)......*anthrax* Williston.

Front mostly yellow; base of the antennæ yellowish; penultimate section of the fourth vein two thirds as long as the ultimate section of the fifth vein; wings rather narrow. (D. C., Mass., La.,* Wisc.,* Ill.,* Kans., S. Dak., Tex.,* Col., Wyom.) .... *longipennis* Loew.

34. Four dorsocentrals; face and cheeks largely or wholly yellow; palpi yellow .... 35.

Two or three dorsocentrals; mesonotum subshining.................. 38.

35. Basal section of the fifth vein much shorter than the apical section, the anterior crossvein before the end of the first vein; knees not yellow; thorax opaque pollinose; three fronto-orbitals; cheeks one third the eye-height; antennæ infuscated above. (Eur.;* Id.,* Wash.*) *perpusilla* Meigen.

Sections of the fifth vein subequal; knees conspicuously yellow........ 36.

36. Third and fourth veins strongly diverging at the tip, veins brown; mesonotum rather densely whitish-gray pruinose; lower half of the frontal vitta yellow. 2.5 mm. (Col.)................. *pruinosa* Coquillett.

Third and fourth veins parallel, their tips but little diverging; front mostly yellow .... 37.

37. Front yellow, a central spot sometimes blackened; mesonotum subshining; veins rather weak; three fronto-orbitals; cheeks one sixth the eye-height; antennæ more or less infuscated, the arista black. (D. C., Mass., La.,* Ill.,* Wisc.,* Kans., S. Dak., Tex., Col., Wyom.) *longipennis* Loew.

Front yellow; mesonotum opaque pollinose; veins brown; four to six fronto-orbitals; cheeks one third the eye-height; antennæ pale yellow, the arista yellow at the base. (Alaska.)............. *pollinosa* n. sp.

38. Front narrow, uniformly brownish or black; face and cheeks black; third antennal joint minute; hairs of the mesonotum arranged in rows; wings broad, the segments of the fifth vein 3 : 2. (D. C., N. J., Mass.,* Ont., La.,* Kans., S. Dak.,* Tex.*)................ *parvicornis* Loew.

Front black above, yellow below; face and cheeks yellow.............. 39.

39. Tarsi black, sometimes the metatarsi yellowish; acrostichal hairs in rows; hairs of calypteres dusky; four fronto-orbitals; basal section of the fifth vein longer than the apical section. (Eur.; Id.,* Wash.*) *sulphuriceps* Strobl.

Metatarsi yellow; hairs of mesonotum irregularly placed; sections of the fifth vein subequal. (D. C.).................... *varifrons* Coquillett.

40. Front above lunule mostly or entirely black; face black; fringe of calypteres white; legs black; antennæ black. (In *superciliosa* the calypteres have a dark fringe.).. 41.

Front largely or wholly yellow; usually the face and always the cheeks yellow .... 48.

41. Side stripes of the thorax broadly yellow; scutellum, upper pleuræ, rear of mesonotum, and base of abdomen, yellow........................ 42.

Yellow stripes of thorax narrower; almost entirely black species....... 43.

42. Mesonotum opaque; sections of the fifth vein equal; frontal lunule yellow; costa ending at third vein. (S. Am., W. Ind.) *xanthophora* Schiner, Williston.

Mesonotum polished; last section of the fifth vein shorter than the preceding section; front black; four dorsocentrals. (Mex.) *picta* Coquillett.

43. Sides of front yellow along the orbits; knees broadly yellow; hairs of calypteres black; fourth vein ending at wing-tip, wings broad. (Eur.;* Wash.,* Ore.*) .... *superciliosa* Zetterstedt.

Frontal orbits black; knees narrowly yellow; hairs of calypteres pale; fourth vein ending usually beyond the wing-tip (compare also *luctuosa* in couplet 31) .... 44.

44. Apical segments of ♂ abdomen yellow; wings broad, the third and fourth veins somewhat divergent, the fourth vein ending much beyond the wing-tip; frontal lunule marked with a small white dot; arista long and pubescent. (N. H., Pa., Fla., La.,* Ill.,* S. Dak.*) *terminalis* Coquillett.

Abdomen black, the incisures more or less yellow; the third and fourth veins subparallel, the fourth vein ending at or slightly beyond the wing-tip .... 45.

45. Arista more than two times the length of the antenna, plainly pubescent, the antennæ short; wings broad; frontal lunule white-pollinose. (Mass.,* N. J., Pa., La., Ill.,* Wisc., Wash.*) .... *angulata* Loew.

Arista shorter, bare; wings narrow .... 46.

46. Antennæ large, porrect, the arista thick; sections of the fifth vein subequal; scutellum black .... 47.

Antennæ small, the arista slender; discal cell small, the sections of the fifth vein 1 : 2; scutellum yellow. (Wash.*) ..... *interfrontalis* n. sp.

47. Antennæ strikingly large; thorax pollinose; four dorsocentrals; frontal lunule often yellow. (*magnicornis* Loew.) (Eur.;* Mass., N. J., Pa., Ga., Ill.,* Wisc.,* S. Dak., Col., Wash.*) .. *grossicornis* Zetterstedt.

Antennæ not abnormal; thorax subshining; four or three dorsocentrals; frontal lunule black. (Proc. Ent. Soc. Wash., VI, 191, 1904.) (Cal.,* Ore.,* Wash.,* Alaska.*) .... *tæniola* Coquillett.

48. Antennæ black, at least the third joint black .... 49.

Antennæ entirely yellow, sometimes the end of the antenna may become infuscated above .... 54.

49. Front entirely yellow, or centrally yellow; fringe and margin of the calypteres dusky .... 50.

Center of front above lunule velvet black, bordered with yellow on the sides; wings narrow, the penultimate section of the fourth vein one third as long as the ultimate section and longer than the posterior crossvein, the sections of the fifth vein subequal; calypteres and fringe white; pollinose species. (Mass., D. C., Ind.,* Ill.*) .. *marginata* Loew.

50. Plump shining black species, with black antennæ and legs; front narrower than long; two or three dorsocentrals. (*platyptera* Thomson.) .... 51.

Notum pruinose; front square; four dorsocentrals .... 53.

51. Frontal orbits black, at least above; subantennal grooves more or less

blackish. (Pa., Mass.,* N. Y.,* N. J., Ill.,* Wisc., La., N. Mex., Col., Id.,* Wash.*) .... *platyptera* var. *coronata* Loew.

Front entirely yellow, not bordered with black; face yellow............52.

52. Lateral yellow stripe of the thorax extending beneath the wings. (*malvæ* Burgess.) (Wisc., N. H., N. J., D. C., Fla., W. Ind.,* Ga., La.,* Ill.,* Mo., Tex.,* Col.)...................*platyptera* var. *jucunda* Wulp.

Lateral stripe extending above the root of the wings. (*lateralis* Williston, 1896, and not of Macquart, 1835, from Europe.) (W. Ind.) *platyptera* var. *allecta* nom. nov.

53. Base of antennæ, scutellum, a prescutellar spot, pleuræ, abdomen, and legs mostly yellow; anterior crossvein opposite or beyond the end of the first vein. (Wash.,* Alaska.*)......................*pacifica* n. sp.

Mostly black species, the whole of the antennæ, the mesonotum except the sides, the scutellum except the tip, the abdomen, and much of the pleuræ and legs black; anterior crossvein before the end of the first vein. (2 mm. (Id.*) ....*varia* sp. nov.

54. Scutellum entirely black; thorax opaque black, the abdomen black, except at sides and sometimes the incisures...........................55.

Scutellum yellow, at least in the middle............................57.

55. Legs, antennæ, cheeks, face and lower part of the front whitish; sections of the fourth vein about 1 : 10; mesopleuræ yellow. (Wash.*) *clara* n. sp.

Legs blackish, antennæ somewhat infuscated; face, front and cheeks yellow; sections of the fourth vein about 1 : 6; pleuræ largely cinereous.56.

56. Knees not differentiated; three fronto-orbitals. (Eur.;* Id.,* Wash.*) *perpusilla* Meigen.

Knees yellow. (Greenland.)........................*arctica* Lundbeck.

57. Palpi large, projecting; scutellum with two bristles; thorax reddish, abdomen brown, its base yellowish; legs yellow, the hind femora tipped with black; penultimate section of the fourth vein longer than the last section of the fifth vein. (W. Ind.).......*innominata* Williston.

Palpi small; four scutellar bristles; four dorsocentrals; mesonotum more or less black; penultimate section of the fourth vein much shorter than the last section of the fifth vein.........................58.

58. Notum pruinose, pleuræ and abdomen but little shining; cheeks nearly as deep as the width of the eye. (If the cheeks are narrow compare *perpusilla* and *pacifica*.) (Id.*).......................*lima* n. sp.

Shining or subshining; cheeks relatively narrow.....................59.

59. Usually broader and larger; mesonotum with a quadrate yellow spot in front of the scutellum; front usually square; sections of the fifth vein 2 : 3 ....60.

Smaller and more slender; mesonotum black to the scutellum; front narrower than deep; sections of the fifth vein more nearly 1 : 2. (*Scutellata* Fallen.)..63.

60. Ovipositor long, tubular, equalling three abdominal segments in length. (W. Ind.*)............................(*Liriomyza*) *tubifer* n. sp.

Ovipositor short, wedge-shaped, about as long as the other abdominal segments. (*melampyga* Loew.) ....61.

61. Tibiæ and tarsi wholly black, the femora yellow varied with black; abdominal segments fasciate with black and yellow. (N. Y., N. Mex.) *melampyga* var. *flavonigra* Coquillett.

Femora, tibiæ and tarsi largely yellow; abdomen not conspicuously fasciate ....62.

62. Genitalia shining black, contrasting with the abdomen. (*flaviventris* Johnson, 1902, and not of Strobl, 1898, which is *grossicornis* Zetterstedt.) (D. C., Mass.,* N. H., N. Y., N. J., La., Wisc.,* Col., Wyom., N. Mex.*) ....*melampyga* Loew, sens. str.

Genitalia concolorous with the yellow-brown abdomen. (W. Ind., Bolivia,* Tex.,* Ill.*) ....*melampyga* var. *sorosis* Williston.

63. Abdomen black above, the sides not yellowish, but the incisures somewhat yellow ....64.

Sides of the abdomen somewhat yellow ....66.

64. Discal cell very small, coextensive with the auxiliary cell, the second and third sections of the fourth vein about 1 : 10; legs with at least the femora yellow; antennæ yellow, sometimes dusky at the tip. (Eur.;* Mass.,* Ill.,* La.,* Tex.,* Id.,* Wash.*)...*scutellata* Fallens, sens. str.

Discal cell surpassing the auxiliary cell, the sections of the fourth vein about 1 : 8; legs darker ....65.

65. Legs, including the femora, somewhat infuscated. (*brassicæ* Riley.) (Eur.;* U. S.) ....*scutellata* var. *pascuum* Meigen.

Legs black except the knees; third antennal joint somewhat darkened at the tip. (Eur.;* Afr.; Id.,* Wash.*)..*scutellata* var. *orbona* Meigen.

66. Legs mostly yellow; usually larger species. (Eur.;* Wash.,* Cal.*) *scutellata* var. *variegata* Meigen.

Legs black except the knees; third antennal joint darkened at the tip. (*pictella* Thomson.) (Eur.;* Id.,* Wash.,* Ore.,* Cal.) *scutellata* var. *puella* Meigen.

Domomyza tamia new species.

♂♀. Length 2.75 mm. Blue-black species with black halteres; face receding in profile; wings broad, veins black, the costa evanescent beyond the third vein; calypteres white and fringed with white hairs. Black, with metallic blue and green reflections. Head dull black, not metallic; front as broad as high, opaque blackish, no lateral shining stripes, the usual shining portion around the ocelli blunt in front, not triangular, seven fronto-orbital bristles, the orbital pubescence, *i. e.*, that between the bristles and the eyes, comparatively long and dense; mouth-opening greatly arched, so that the end of the clypeus is directly under the antennæ, the face thereby appearing to recede in profile, the face rather sharply carinate by the descending lunule, the antennal grooves deep; cheeks two thirds as deep as the eye-height, the hairs along the oral margins not conspicuous. Antennæ small and black, the outer joint not longer than the inner, the arista one and one half times as long as the antenna. Proboscis short, black, its labella sometimes dusky; palpi small, narrow, straight and with a single terminal hair. Thorax, scutellum and abdomen metallic green or blue, three pairs of long dorsocentrals, the pubescence normally fine; abdomen highly polished, last segment of female long, triangular, jet black. Halteres black, calypteres entirely whitish and with white hairs. Legs black, subshining. Wings broad, hyaline, veins black, the costa thickened and vaulted in front of the marginal cell, and vanishing beyond the end of the third vein; third vein ending slightly in front of the tip of the wing, the fourth vein somewhat diverging from the third and ending beyond the wing apex; discal cell relatively broad, the anterior crossvein slightly beyond its middle; outer segments of fourth vein proportioned one to four, segments of fifth vein four to three.

One male and five females, Wawawai, Washington, May 20, 1911.

This species might well be assigned to Rondani's genus *Domomyza,* the other species of which are evidently related to the second group of *Agromyza,* with pale halteres. The present species shows such close relationship to the *æneiventris* group that it should not be separated from these species merely because of an abbreviation of the costa. The species *Agromyza reptans* Fallen and *nigripes* Meigen frequently exhibit a thinning away of the costa beyond the third vein and such individuals could very well be classified as *Domomyza.*

Agromyza diadema new species.

Female.—Length 3 mm. Polished black, the front and lunule yellow, notopleural and meso-pteropleural sutures very narrowly yellowish. The yellow of the front becoming brown on the upper part, but clearly differentiated from the black orbits and the small ocellar triangle; sides of ocellar triangle convex. Four reclinate fronto-orbitals, uniformly spaced, the space between them and the eye unusually narrow and nearly devoid of hairs. Face strongly receding, no vibrissal angle, cheeks one fifth the eye-height, a single oral vibrissa; in profile the front edge of the clypeus is visible; center of face flattened, scarcely carinate nor grooved, the edge of the epistome shallowly arched. Antennæ nearly reaching the margin of the epistome, the almost bare arista five times the length of the third joint. Palpi and proboscis black, the former broad, but not reaching beyond the oral opening.

Two dorsocentrals, about eight rows of acrostichals, one presutural, two notopleural, two sternopleurals, one strong mesopleural. Last abdominal segment jet black, flattened, a little longer than the preceding segment, the projecting ovipositor slender, enlarged apically, its upper and lateral edges serrate. Middle tibiæ with a bristle on the postero-extensor edge below the middle and a smaller one just above. Calypteres whitish, the margin and fringe black. Halteres black, their roots paler. Wings hyaline, veins strong; costa thickened at the junction of the first vein; auxiliary vein separate from the first vein, but closely approaching it near the tip; basal section of front edge of the discal cell twice as long as the other section, the latter nearly equalling the posterior crossvein, and about one fourth the length of the ultimate section of the fourth vein; sections of the fifth vein three to two; anal vein faint; the third section of the costa nearly equal to the fourth and about one fifth the length of the second section.

One specimen, Hayti.

While the auxiliary vein ends independently in the costa, it approaches very closely to the first vein near its end. Its course is thus quite different from that found in the lighter colored species of *Agromyza*.

Agromyza maura var. setifrons new var.

Male.—Seven fronto-orbital bristles, orbital pubescence long; crossveins not approximate, the outer segments of the fourth vein proportioned about one to four, discal segment of the fifth vein a little longer than the last segment; third vein uniformly curved backward so that it diverges from the second and ends almost at the wing tip, fourth vein ending considerably beyond the tip of the wing; wings broadly rounded; four sternopleural bristles in the upper series; abdomen black.

One male, from Troy, Idaho, June 14, 1908, collected by William M. Mann.

The variations of *maura* indicate permutations of the characters rather than phyletic segregations. The differences between *maura* and *morionella,* as stated by authors and repeated in the table, do not exactly tally on the score of European specimens before me. The varieties named in the table are distinct enough in their sets of characters, but probably additional specimens from other localities will disclose other combinations lessening the definiteness of varietal limits.

Agromyza maura var. nasuta new var.

Male.—Length 2 mm. Ocellar triangle long, its sides concave, the polished frontal orbits with numerous hairs, only the convergent lowermost two fronto-orbital bristles present. Face with a prominent tubercle present between the antennæ in lieu of a carina, the subantennal grooves deep; vibrissal angle projecting, as is also the greatly excised edge of the epistome. Antennæ reaching below the middle part of the excision of the epistome, the arista three times as long as the last joint. Palpi slender, somewhat curved, but not flattened. Second section of the costa less than four times as long as the third, which is subequal to the fourth section; anterior crossvein at two thirds the length of the discal cell, the segments of the fourth vein about one to five, the basal section of the fifth vein longer than the outer section.

I have sixteen specimens before me, all males, from Troy, Idaho, Pullman, Washington, and Steiermark, in Europe. The last mentioned were received from Professor Strobl. This variation is most nearly related to *curvipalpis;* it is not the true *maura* nor *morionella,* the males of which have a carinate face and the full set of fronto-orbital bristles.

Agromyza rutiliceps new species.

Male.—Length 2 mm. Shining black, very lightly dusted, the front and vertex except the ocellar triangle and the upper orbits, the face, cheeks, labella, very narrow line on the notopleural suture, halteres, calypteres and their fringe, and the base of the wings reddish to yellow. Antennæ and palpi black. Bristles of head and thorax very long, the ocellar bristles reaching nearly to the antennæ; four pairs of fronto-orbitals; four dorsocentrals, one of them presutural. Abdomen with short close hairs, none of the incisures pale, hypopygium small, concolorous. Legs entirely deep black. Wings hyaline, veins narrowly black, the fourth vein ending beyond the wing tip, its penultimate section one third the length of the ultimate, one and one half times the length of the posterior crossvein and three fourths the length of the ultimate section of the fifth vein; anterior crossvein beyond the end of the first vein.

One specimen, sent in some grass sweepings by William M. Mann, who collected it at Nigger Hill, Powell County, Montana, July, 1912.

Agromyza genualis new species.

♂♀. Length 2.5–3.5 mm. Black, the front, face, cheeks, lower occipital orbits, narrow line bounding the mesopleuræ above and behind, the halteres, calypteres and root of wing, a transverse line below the scutellum, the knees and some of the incisures of the abdomen yellow. Upper frontal orbits and the ocellar triangle blackish. Antennæ and palpi black. Bristles strong, five or six fronto-orbitals, the uppermost somewhat distant from the others, on the orbits besides the fronto-orbitals a row of close minute hairs; ocellar bristles reaching about two thirds the distance to the antennæ; two vibrissæ. Cheeks about one fourth the eye-height. Thorax opaque black, dusted, the bristles and setulæ strong; four dorsocentrals, of which one is in front of the suture; four rows of acrostichals and numerous lateral setulæ present; pleuræ pollinose, meso- and sternopleuræ setulose, one sternopleural and a row of four mesopleural bristles longer, prothoracic bristle large. Abdomen subshining, in the female the hind margin of the fifth segment alone is narrowly yellow, sixth segment of female broad, depressed; male abdomen entirely black, the hypopygium somewhat larger than the distal segments, globular, deeply excised and with two black linear lamellæ. Legs stout, black, the knees sharply marked with yellow. Fringe of calypteres black. Wings narrow, hyaline, veins strong, the third section of the costa one and one half times the fourth; anterior crossvein beyond the end of the first vein, segments of discal cell two to one, the penultimate section of the fourth vein about one sixth the ultimate, shorter than the posterior crossvein and about two fifths the length of the ultimate section of the fifth vein.

Four males and three females. Powell County, Montana (Wm. M. Mann); Moscow Mountain, Idaho; Mount Constitution, Washington.

Agromyza auriceps new species.

♂♀. Length 2 mm. Black, pollinose, the occiput, thorax and abdomen with grayish tinge, the legs black. Interfrontalia, face, cheeks, labella, halteres and the narrow incisures of the abdomen yellow. Antennæ and palpi black. Vibrissal ridge brown; clypeus black. The narrow frontal orbits black, gradually merging into yellow anteriorly; four fronto-orbitals; ocellar bristles reaching half way to the antennæ. Thoracic setulæ rather fine and long, about four rows of acrostichals; the dorsocentrals scarcely differentiated from the setulæ, except the posterior pair. Notopleural suture very narrowly yellow; a narrow triangular yellow mark descending on the meso-pteropleural suture; one posterior sternopleural and one posterior mesopleural bristle. Calypteres dirty yellow and with blackish fringe. The penultimate segment of the male abdomen somewhat shining, the hypopygium small, globular, its parts not projecting; in the male the incisures of the venter also rather narrowly but uniformly yellow; in the female the incisures of the basal four segments very narrowly of the penultimate segment rather broadly yellow, the ultimate segment shining jet black, compressed, and as long as the preceding three segments together; hairs of the abdomen rather conspicuous, the membrane between the sternites and the tergites yellow. Wings hyaline, veins blackish, rather strong, the second section of the costa two and one half times the third, which is equal to the fourth, the ends of the third and fourth veins diverging; anterior crossvein before the middle of the discal cell, the penultimate section of the fourth vein about one fourth the ultimate and a little longer than the posterior crossvein; the ultimate section of the fifth vein slightly longer than the penultimate section; anal vein strong, nearly reaching the wing margin.

Five males and six females, Moscow Mountain, Idaho; one female, Colorado (C. F. Baker, collector).

This species is probably closely related to *Agromyza Davisii*, recently described by Walton, but can scarcely be the same on account of its weak thoracic bristles.

Agromyza interfrontalis new species.

Female.—Length 1.7 mm. Black, subshining, the center of the front, labella, scutellum except the anterior angles, upper mesopleural sutures, calypteres and root of wings, halteres, and rather narrowly the knees, yellow; laterally the incisures of the basal segments of the abdomen becoming yellowish, and the penultimate segment with an apical yellow band. Front becoming narrower towards the antennæ, the orbits relatively broad and nearly as wide as the interfrontal stripe; ocellar triangle rounded and black, the ocellar bristles small, scarcely reaching one fourth the length of the front. Cheeks piceous black, about one sixth the eye-height; a single vibrissa. Three dorsocentrals, acrostichals very sparse. Last segment of the abdomen rounded, not longer than the penultimate segment, the ovipositor short. No tibial bristles. Margin of the calypteres a little dusky. Wings hyaline, veins dark; third section of the costa longer than the fourth section and about one third as long as the second section; discal cell small, the posterior crossvein opposite the end of the first vein, the anterior crossvein before the middle of the discal cell; segments of the fourth vein proportioned about one to six, of the fifth vein about one to two; the fourth vein ending at the wing tip, subparallel with the third.

One specimen, Tacoma, Washington, August 27, 1912.

Structurally this species is related to *luctuosa* Meigen, from which it differs in the color of the scutellum and of the front.

Agromyza pollinosa new species.

Male.—Length 2 mm. Largely black, overlaid with cinereous brown pollen. Head yellow, the occiput except laterally and below and the round ocellar triangle black. Ocellar bristles reaching three fourths the distance to the frontal suture; four to six pairs of fronto-orbitals; face strongly receding, carinate between the subantennal depressions; cheeks about one third the height of the obliquely oval and pubescent eyes; one vibrissa and three weak oral hairs. Mouth-parts yellow, palpi broad. Antennæ yellow, the third joint subreniform, the arista yellowish at its base. Pleuræ and notum subopaque, with grayish pollen; the narrow notopleural and meso-pteropleural sutures yellow; bristles long, four dorsocentrals, four rows of acrostichal setulæ. Abdomen subshining, the lateral membrane yellow; hypopygium relatively large, with two rather long, narrow lamellæ in the apical excision. Apex of the coxæ and the broad knees yellowish; middle tibiæ without extensor bristles. Halteres, calypteres and root of wing yellow; wings hyaline, narrow, the veins slender but dark; third section of costa longer than the fourth and about one fifth as long as the second section; anterior crossvein just beyond the end of the first vein and just beyond the middle of the discal cell; sections of fourth vein about one to five, of the fifth vein subequal.

Two specimens from grass sweepings gathered by Professor Wm. T. Shaw at Sitka, Alaska, July 16, 1907.

Agromyza pacifica new species.

♂♀. Length 1.5–2 mm. Pale yellow, the following parts black, cinereous dusted; middle of occiput, disk of mesonotum, leaving the sides broadly and a large prescutellar spot yellow, metanotum largely, spots at base of posterior coxæ, that on the sternopleuræ large and triangular, and also the hypopygium black. The last abdominal segment of the female is short and jet black. Third antennal joint, arista except base, front of clypeus, and small irregular spots on pleuræ black or blackish. Front rather broad, quadrate, three fronto-orbitals, ocellar bristles reaching two thirds the distance to the antennæ; face not carinate; cheeks one fourth the eye-height; vibrissa longer than the sparse oral hairs. Four dorsocentrals, setulæ very sparse but long, acrostichals in two irregular rows; three mesopleural bristles present in a vertical posterior row, the center one longest. Calypteres with dusky margin and fringe. Legs less pure yellow, no tibial bristles. Centers of abdominal tergites a little dusky. Wings hyaline; third section of costa subequal to the fourth and a little more than one fourth the extent of the second section; anterior crossvein just beyond the termination of the first vein and beyond the middle of the discal cell; fourth vein ends beyond the wing tip, its sections one to six; basal section of the fifth vein somewhat shorter than the apical section.

One male, six females. Bellingham and Mount Constitution, Washington; Douglas, Alaska (E. L. Jenne).

Agromyza varia new species.

Female.—Length 2 mm. Largely blackish, the following parts yellow; front, face, cheeks, occipital orbits below, proboscis, broad sides of mesonotum, sutures of pleuræ, lateral membrane of abdomen, narrow apex of penultimate abdominal segment, root of halteres and underside of anterior femora. Remainder of the body black or blackish, including the antennæ, entire arista, palpi, ocellar triangle, occiput, disk of mesonotum, scutellum except its apex, most of pleuræ, margin of calypteres, knob of halteres, the abdomen, of which the short terminal segment is jet black, and most of the legs. Front square, three strong fronto-orbitals, ocellar bristles reaching two thirds the distance to the antennæ; face rather flat, cheeks one third the eye-height; vibrissa a little longer than the five oral hairs. Four dorsocentrals, acrostichals very sparse, in two irregular rows; two mesopleural bristles and a few additional setulæ. No tibial bristles. Wings hyaline; the third section of the costa longer than the fourth and about one third as long as the second section; anterior crossvein before the end of the first vein and beyond the middle of the discal cell; fourth vein ending at the wing tip, its sections about one to seven; basal section of the fifth vein two thirds as long as the outer section; posterior crossvein equal to the penultimate section of the fourth vein; auxiliary vein ending much before the end of the first vein.

One specimen, Moscow Mountain, Idaho, June 12, 1910.

This species is structurally very close to *pacifica*, differing but slightly in the neuration. The setulæ of the mesopleuræ are less evident in *pacifica* and the arista is less robust and more openly pubescent. The blackened knob of the halteres is unusual for this section of the genus.

Agromyza clara new species.

Male.—Length 1 mm. Face, cheeks, lower occiput, lower front, antennæ, mouth-parts, halteres, legs and most of pleuræ whitish to pale yellow. Upper occiput, vertex, mesonotum except lateral margins, scutellum, metanotum except a subscutellar cinereous line, spots on sternopleuræ and hypopleuræ, and abdomen except very narrow incisures, black or blackish. Front very broad and square, with three fronto-orbitals; the ocellar bristles reaching about one third the distance to the antennæ; face greatly receding, nearly flat; antennæ porrect rather than decumbent; cheeks about one half the eye-height, a single vibrissa and a single oral hair present. Apparently three dorsocentrals present, acrostichals very sparse; pleuræ not setulose. Calypteres with dusky margin and fringe. Tarsi a little darkened; no tibial bristles. Wings hyaline, veins rather strong and dark; third section of costa equal to fourth and about one fourth the length of the second section; discal cell small, the anterior crossvein before the end of the first vein, and beyond the middle of the discal cell; fourth vein ending at wing tip, its segments about one to ten; basal section of fifth vein but little more than one half the length of the distal section.

One specimen, Mount Constitution, Orcas Island, Washington, July 31, 1908.

Agromyza lima new species.

Male.—Length 1.5 mm. Yellow and black in color, the following parts of the body are pale yellow; head, except center of occiput, most of pleuræ, sides of mesonotum, most of scutellum, incisures of abdomen, antennæ, mouth-parts, halteres, calypteres, root of wings, and most of legs. The following parts of the body are black and more or less overlaid with grayish pollen; small ocellar triangle, occiput except orbits, a humeral spot, disk of mesonotum extending to the scutellum and scarcely notched along the sides, spot in meso- and sternopleuræ, the last-mentioned largest; basal angles of scutellum, metathorax largely, and abdomen mostly, except narrow incisures and broader sides of the segments; the hypopygium is also black. Front slightly longer than broad and narrower toward the antennæ; three or four small fronto-orbitals; ocellar bristles reaching about one third the length of the front. Antennæ reaching half way to the epistome, the arista two times the length of the third joint, its base yellowish. Face moderately carinate; cheeks nearly as deep as the eye-height; vibrissæ not longer than the four or five oral hairs. Two dorsocentrals, no setulæ; meso- and sternopleuræ bare except for the single small bristle on each. Femora pale yellow, tibiæ and tarsi testaceous, no tibial bristles. Wings hyaline, veins dull yellowish; the third section of the costa subequal to the fourth and one fourth the length of the second section; the fourth vein ends at the wing tip, its sections about one to six; discal cell small, the anterior crossvein before its middle and before the end of the auxiliary vein, the posterior crossvein just beyond the end of the first vein and shorter than the second section of the discal cell; basal section of the fifth vein one half as long as the outer section.

Female.—Slightly larger, about 2 mm. in length. The abdomen is blacker, the incisures scarcely yellow, except the apical margin of the penultimate segment; the ultimate segment is jet black, cylindrico-conical, about as long as two of the middle segments together, the ovipositor short, tubular.

Three males and four females, Moscow Mountain, Idaho, July, 1911 and 1912.

Liriomyza tubifer new species.

Female.—Length 2 mm. Shining yellow except the following parts black: occiput except the lower orbits and oral portion, small ocellar spot, center of mesonotum broadly but with narrow incisions above the humeri, at the suture and in back on the intra-alar stripe, and with a broad quadrate emargination before the scutellum (laterally and posteriorly the mesonotum is yellow), small black spots on humeri, notopleural suture, mesopleuræ below and above hind coxæ, and a large triangular black spot on the sternopleuræ, also the metanotum and the large ovipositor black. The abdomen is yellowish, with broad brown fasciæ on the middle of the segments. Front very little longer than wide, with four fronto-orbitals, the upper one reclinate and distant from the lower converging smaller three; ocellar bristles extending down one third the length of the front. Antennæ not reaching the epistome, the arista coarse and black. Mouth-parts yellow. The vibrissa scarcely differentiated from the row of five oral hairs. Two dorsocentrals; about six rows of fine acrostichals; one presutural. The last abdominal segment as long as the preceding three, compressed near the base, the cylindrical ovipositor projecting. Coxæ and femora pale yellow, the tibiæ and tarsi blackish; no tibial bristles. Halteres yellow; calypteres with dark fringe. Wings hyaline; the third section of the costa two thirds as long as the fourth section and about one sixth as long as the second section; the anterior crossvein before the end of the first vein and at the middle of the small discal cell; the sections of the fourth vein proportioned one to seven, of the fifth vein two to three; posterior crossvein oblique, opposite the end of the first vein and shorter than the front sections of the discal cell.

One specimen, Hayti.

The genus *Liriomyza,* established by Mik for a species with long ovipositor, is hardly tenable. The present species, aside from the ovipositor, would be considered merely a color variation of *Agromyza melampyga*. It is doubtful if the males would offer structural differences from ordinary Agromyzas, and, moreover, the length of the ovipositor and of the last abdominal segment of the female is a variable character among the several species.

NOTES ON SOME SPECIES OF *Agromyza*.

Agromyza curvipalpis Zetterstedt. The European specimens I possess have the veins thinner than in the majority of the American specimens. One male from Woods Hole, Massachusetts, is larger, the head a little sturdier and the lateral shining stripes of the front are narrower than usual, including the orbits from the eyes *to* the frontal bristles. Usually the frontal bristles are located upon the brightest part of the shining stripes. Various authors mention the porrect curved palpi of the male. In all my males the palpi are not especially conspicuous. The females are separable from *maura* with great difficulty. The best character seems to be the relative denseness of the pubescence on the frontal orbits. In *maura* these hairs grow dense and are easily seen under a high magnification.

Agromyza dimidiata Walker. This species was described as a *Phytomyza,* but was thought by Coquillett to be the same as *trifolii,* which is *scutellata*. The brief description makes identification impossible.

Agromyza invaria Walker is unrecognizable from the description.

Agromyza lacteipennis Fallen. This European species was reported by Coquillett as occurring in Alaska. It belongs to the Milichiine genus *Meoneura,* as has already been noticed by Hendel,[1] and is specifically the same as *vagans* Fallen. It is of common occurrence in the northwest.

Agromyza neptis Loew might be confused with *parvicornis* Loew, which it greatly resembles. *Neptis* has the wings more slender, with the front and hind borders more nearly parallel and the veins darker; the marginal cell is about four times as long as the submarginal along the costa; in *parvicornis* it is about three times as long. The veins at the base of the wing are dusky and not yellowish. The arista is scarcely twice as long as the antennæ and is microscopically pubescent.

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[1] Wiener entomologische Zeitung, XXX, 35 (1911).

Agromyza parvicornis Loew. The veins are usually yellowish, especially pronounced on the basal half of the wing. The arista is visibly pubescent and fully two and one half times as long as the antenna. See note under *neptis.*

Agromyza sorosis Williston. I have a specimen received from Dr. Williston's collection, from Piedro Blanca, Bolivia, April, which has the pubescence of the arista more distinct than in the specimens from the states.

Agromyza sulphuriceps Strobl. Although I have no European material for comparison, I place six specimens from Troy, Idaho, and Kamiac Butte, Washington, in this species. They agree so thoroughly with Professor Strobl's description that it would add nothing to the knowledge of this genus to bestow a new name on these flies. The species is apparently very close to *varifrons* Coquillett, and possibly is the same. The differences given in the table, all that is tangible in the descriptions, are probably more apparent on paper than real in nature.

Agromyza tæniola Coquillett. This may be a variation of *grossicornis.* Coquillett's type from California has three dorsocentrals, the third antennal joint very small and the mesonotum not pruinose. I have specimens that agree in other particulars with the description of *tæniola,* but have four dorsocentrals of varying size, and the mesonotum lightly pollinose.

Agromyza tiliæ Couden. This species was described from material reared from stem galls of the American linden. It is very close to *simplex* according to Coquillett and Couden, the only discernible differences being the position of the frontal bristles and the shape of the ocellar triangle. As both of these characters are quite variable in other species of this genus, the form *tiliæ* may be included with *simplex* as variations of the broad species *maura.* The shining frontal triangle is large, elongate and has its sides concave; the lower four frontal bristles are close together and well separated from the upper bristle. The two sections of the fifth vein are equal, as in *simplex,* but the space between the crossveins is greater, ranging from one half to nearly the length of the posterior crossvein. I have a specimen presumably belonging here, from Montreal Island, Quebec, received from G. Chagnon. The lower frontal bristles, however, are not so crowded as pictured for *tiliæ.* The specimen has the frontal lunule cinereous, differing in this respect from the other specimens of *maura*. The face is receding and slightly carinate, and the tip of the abdomen is bronzed.

Agromyza tritici Fitch. Length 2 mm. Black, the lower part of the front and the oral margin yellowish; legs blackish; knees yellow; fourth vein evanescent beyond the small discal cell. New York. The description is too brief to place this species in the table. It suggests *Meoneura* or *Napomyza* rather than *Agromyza*. The figure shows the costa stopping at the third vein.

TABLE OF THE SPECIES OF *Phytomyza*.

Front narrow; third antennal joint ending in a point, as in *Cerodonta;* third vein ending far before the tip of the wing. (Eur.; Wash.*) *acuticornis* Loew.

Front normally broad; the third antennal joint not pointed................2.

2. Front principally black or cinereous; antennæ black...................3.

Front and cheeks largely yellow.....................................11.

3. Abdomen yellow, except the tip; thorax and legs opaque cinereous black; mesonotum densely hairy between the bristles. (N. Y.*) *bicolor* Coquillett.

Abdomen mostly black (sometimes the incisures narrowly yellow); mesonotum not densely hairy ....4.

4. Frontal orbits whitish, contrasting with the brownish central portion of the front; anterior dorsocentrals small; cheeks one-sixth the eye-height; arista slender. (Id.,* Wash.*)..............*orbitalis* n. sp.

Front blackish, the orbits concolorous; four dorsocentrals..............5.

5. Frontal orbits, thorax and abdomen shining; wings nearly hyaline......6.

Frontal orbits opaque; thorax more or less dusted; four fronto-orbitals. (*obscurella* Fallen.) ....7.

6. Entirely black, except the halteres and proboscis; veins blackish up to the base; three fronto-orbitals; fringe of calypteres black; third antennal joint shorter than deep. (N. Y.,* Id.*)................*nitida* n. sp.

Legs partly fuscous; base of wings and notopleural suture yellowish; four fronto-orbitals; fringe of calypteres yellow; third antennal joint longer than deep. (D. C., Ont.*).................*clematidis* Loew.

7. Wings lightly clouded, especially in front; mesonotum subshining; cheeks fuscous. (Eur.; Wash.*)....*obscurella* var. *nigripennis* Zetterstedt.

Wings not with fuscous tinge, the marginal cell not brownish...........8.

8. Cheeks black; abdomen and legs generally black......................9.

Cheeks brown; sides of abdomen, some of the incisures, and the knees generally yellowish ....10.

9. Knees paler; second section of the costa four times longer than the third

section, the third vein ending a little in front of the tip of the wing; abdomen subopaque. (Eur.;* Greenl., Cal., Id.,* Wash.*)
obscurella Fallen, sens. str.

Legs black; the second section of the costa about three times longer than the third section, the third vein ending much before the tip of the wing; abdomen more shining. (Eur.;* Greenl., Id.,* Wash.*)
obscurella var. *nigritella* Zetterstedt.

10. Thorax opaque, cinereous dusted, with a faint yellowish humeral spot. (D. C., Mass., Cal., Ore., Wash.,* Alaska.)
obscurella var. *ilicicola* Loew.

Thorax subshining, slightly dusted, no humeral spot. (Eur.;* Id.,* Wash.,* Alaska.*) .... *obscurella* var. *nigra* Meigen.

11. Antennæ yellow, the third joint sometimes infuscated................ 12.

Antennæ black, or at least the third joint entirely black............... 14.

12. Cheeks broader than the eye-height; the third antennal joint elongate-oval; pleuræ and legs yellow. (Ill.*)................. *genalis* n. sp.

Cheeks narrower than the eye-height; the third antennal joint short-rounded .... 13.

13. Third antennal joint bluntly rounded, pubescent and dusky; pleuræ, abdomen and legs yellow. (Eur.; Ind.*).............. *analis* Zetterstedt.

Third antennal joint minute and bare; pleuræ, abdomen and legs black, but variegated with yellow. (Eur.;* Ohio, Ill., Alaska.)
flavicornis Zetterstedt.

14. Femora in part at least yellowish; base of antennæ yellow; lateral margins of thorax at least broadly yellow.............................. 15.

Femora black, except the knees; antennæ entirely black or dark brown; blackish species .... 19.

15. Wings dark, veins blackish; scutellum cinereous black; opaque black species. (D. C.).................................... *nervosa* Loew.

Wings hyaline; scutellum yellow, or at least usually yellow in the middle; species often yellow .... 16.

16. Body subshining; mesonotum marked with four brown vittæ, the middle pair scarcely extending beyond its middle. (Tex.)
clemativora Coquillett.

Body opaque dusted; mesonotum marked with cinereous black. (*flava* Fallen.) .... 17.

17. Pleuræ, abdomen and legs largely yellow .... 18.

Pleuræ, abdomen and legs largely black. (Eur.;* Greenl.)
flava var. *zetterstedti* Schiner.

18. Pleuræ, except part of the sternopleura, yellow; abdomen yellow; mesonotum with two narrow yellow vittæ dividing the dark color into three parts. (Eur.;* Wash.*)................ *flava* Fallen sens. str.

Pleuræ with the dark color more extended; abdomen sometimes dusky in part; yellow stripes of the mesonotum not evident. (Eur.;* Id.,* Ore.*)........................... *flava* var. *flavoscutellata* Fallen.

19. Sides of thorax and the humeri broadly yellow. (Eur.;* Id.,* Wash.*) *bipunctata* Loew.
Notopleural suture narrowly yellow, humeri not yellow...............20.
20. Mesonotum, pleuræ and abdomen subshining; bristles fine; arista short-pubescent. (Eur.; Conn.,* D. C., Ill.,* Id.*).......*aquilegiæ* Hardy.
Notum and pleuræ opaque cinereous black; bristles coarse.............21.
21. Arista much thickened and closely pubescent; usually three fronto-orbitals. (Eur.; Id.,* Wash.*)........................*crassiseta* Zetterstedt.
Arista slender, as usual ....22.
22. Arostichals present; ovipositor longer than the last abdominal segment. 23.
Acrostichals absent; ovipositor shorter than the last segment; incisures yellow. (N. Y., Mass.,* Conn., Pa., N. J., B. C.*) .*chrysanthemi* Kowarz.
23. Incisures of the abdomen conspicuously yellow. (Eur.;* Greenl., Id.*) (*solita* Walker?) ....*affinis* Fallen.
Incisures not yellow, only the last segment banded. (Eur.;* Mass., N. Y., D. C., Ont., Id.,* Ore.,* Wash.,* Cal.*) (*genualis* Loew.) *albiceps* Meigen.

Phytomyza orbitalis new species.

♂♀. Length 1.5 mm. Black, with a slight brownish tinge, lightly dusted. Frontal orbits marked with a yellow stripe bearing the bristles. Proboscis, notopleural suture broadly, humeri, some of the abdominal incisures narrowly, knees, tarsi and root of wings more or less dark brownish. Humeral callus sometimes yellowish. Halteres whitish yellow. Four fronto-orbitals; center of front opaque, but sometimes brownish; cheeks one sixth the eye-height; vibrissa not much stronger than the oral hairs; third joint of antennæ rounded-ovate, scarcely pubescent, the arista microscopically pubescent, two times the length of the third antennal joint. Five dorsocentrals, of which one is presutural, but the anterior three weak and scarcely differentiated from the setulæ; four scattered rows of acrostichals; two sternopleurals, the large mesopleural near the top of the row. Last abdominal segment short, conical. Fringe of calypteres dusky; wings nearly hyaline, the fourth vein nearly straight, ending beyond the wing tip, the third section of the costa but little shorter than the following section.

Twenty-two specimens, from Collins, Troy and Moscow Mountain, Idaho, and from Pullman, Kamiac Butte and Oroville, Washington; May to August, but most of the specimens taken in June.

The species is structurally very much like *obscurella* Fallen. The arista, however, is more slender and less perceptibly pubescent, the cheeks are narrower and the dorsocentrals are less pronounced.

Phytomyza nitida new species.

♂♀. Length 1.3 mm. Black, rather shining, the proboscis, halteres and root of wing whitish. Two or three fronto-orbitals; the vibrissa no longer than the oral hairs. Eyes large, leaving the cheeks about one fourth the eye-height. Third joint of antennæ orbicular, not hairy, the arista about twice the length of the third joint. Four small dorsocentrals, the acrostichals minute; one fine mesopleural and one sternopleural bristle, no setulæ. Terminal segment of abdomen of female short. Calypteres with dusky margin and fringe. Wings lightly infumated, the fourth vein ending at the wing tip or just beyond, the fourth section of the costal margin about twice as long as the third.

Five specimens from the Cedar Mountains of Idaho, taken at Troy, Bovill and Moscow; and one from White Plains, New York, the last mentioned specimen collected by J. R. de la Torre Bueno.

This species is apparently close to *morio* Zetterstedt, but the wings are not white. It differs from the related *obscurella* Fallen and *orbitalis* n. sp. in having three fronto-orbitals, the dorsocentrals and especially the acrostichal and other setulæ weak, and the pollinosity greatly reduced.

Phytomyza genalis new species.

♂♀. Length 2.5 mm. Robust, yellow, the ocellar triangle, occipital spot, disk of mesonotum, the scutellum and metanotum, a fainter spot above the posterior coxæ, and in the female the bases of the abdominal segments, cinereous black; ovipositor and apical half of preceding segment shining jet black. Eyes small, rounded-oval, the front and cheeks broad, the latter comprised largely of the obliquely descending genæ: four fronto-orbitals; vibrissa small. Antennæ yellow, elongate, the third joint one half longer than deep, nearly bare, the black, bare arista two and one half times as long as the third joint. Mouth-parts yellow. Four long dorsocentrals, two rows of sparse acrostichals, one long mesopleural. Tarsi a little dusky. Halteres yellow. Calypteres with a dense dusky fringe. Wings brownish hyaline, root of first vein yellow, the fourth vein straight, ending just beyond the wing tip.

Two specimens, Chicago, Illinois.

The species resembles *analis* Zetterstedt, but has much smaller eyes, longer antennæ, dark scutellum, and in the female a fasciate abdomen.

NAPOMYZA Haliday.

Anterior crossvein at two thirds the length of the small discal cell, the last section of the fifth vein about five times as long as the preceding section ....2.

Discal cell minute, the posterior crossvein nearly opposite the anterior; ultimate section of the fifth vein eight or more times as long as the preceding section ....3.

2. Four dorsocentrals; thorax opaque gray pruinose; head largely black; legs black, except the knees. (Alaska.) (*Agromyza.*) .*parvicella* Coquillett.[1]
Dorsocentrals weak, thorax somewhat subshining, the sides broadly yellow; head yellow except the occiput; anterior tibiæ and tarsi yellowish. (Id.*) ....*plagiata* sp. nov.

3. Posterior crossvein in front of the anterior crossvein; ovipositor depressed; opaque black species with fuscous head, pale knees, notopleural stripe and incisures of abdomen. (Eur., Id.,* Wash.).....*anomala* Strobl.
Posterior crossvein opposite the anterior crossvein; ovipositor compressed; mostly cinereous black, the head yellowish. (Eur.;* N. H., Ill., Mo., Col.,* Alaska.) ....*lateralis* Fallen.

Napomyza plagiata new species.

Female.—Length 2.5 mm. Robust, opaque blackish, the front, face, cheeks, lower occipital orbits, proboscis, broad sides of the mesonotum, parts of the pleuræ, narrow apical margins of the first, second and fifth abdominal segments, root of wings, calypteres, knees, anterior tibiæ and the tarsi yellowish; knob of halteres whitish. Front broad, a little dusky towards the antennæ, four fronto-orbital bristles; antennæ brown, the third joint round, with short pubescence, arista blackish, two times as long as the third joint, minutely pubescent. Cheeks at the middle one fifth as deep as the eye-height, the vibrissæ not larger than the oral hairs. Anterior dorsocentrals scarcely larger than the adjacent setulæ, acrostichals in four very irregular rows; one sternopleural and one mesopleural bristle. Last segment of the abdomen transverse and polished, the ovipositor short, broad, depressed and deeply scabrous. margin and fringe of calypteres dusky. Wings nearly hyaline, veins brown, the fourth vein ending just beyond the wing tip, its sections about one to twenty, the sections of the fifth vein proportioned about one to five, the anterior crossvein at two thirds the length of the discal cell.

One specimen, Avon, Idaho, July 26, 1912.

[Reprinted from Journal of the New York Entomological Society, Vol. XXI, No. 4, December, 1913.]

A SYNOPSIS OF THE DIPTEROUS GROUPS AGROMYZINÆ, MILICHIINÆ, OCHTHIPHILINÆ AND GEOMYZINÆ.

By A. L. Melander,

Pullman, Washington.

(Continued from p. 273.)

Subfamily GEOMYZINÆ.

Table of the Genera.

Middle of face with a pronounced tubercle; anterior fronto-orbital proclinate; calypter entirely devoid of cilia; only the root of the auxiliary vein present, the costal break immediately before the end of the first vein; cheeks comprised largely of the lateral prolongations of the center of the face; mesopleuræ entirely bare. (North America.)
Sinophthalmus Coquillett.

Face not tuberculate; anterior fronto-orbital reclinate; calypteres fringed with cilia; auxiliary vein weak, but usually meeting the costa some distance before the end of the first vein, at which place normally is located the costal break; lateral prolongations of the center of the face narrow; mesopleuræ often setulose or bristly................2.

2. Cheeks narrow, less than one fourth the eye-height, the center of the face broader than the cheeks at the vibrissæ; arista plumose to loosely pubescent, more than one and one half times the length of the antenna, its basal segment long, the third antennal joint with fine but perceptible pubescence, especially along the front edge; upper occiput

usually concave; anal angle of wing usually reduced and without large alula; marginal cell typically long. (OPOMYZINA.)...............3.

Cheeks broad, usually more than one fourth the eye-height, at the vibrissal angle usually broader than the diameter of the central part of the face; arista shorter and sub-bare, the microscopic hairs close together, its basal segment usually short, the third antennal joint without perceptible hairs arising from the spongy pubescence; occiput flattened or convex; anal angle evident and with alula; marginal cell typically not long and narrow. (CHIROMYIINA.)........................20.

3. Dorsocentrals extending in front of the suture; wings pictured.........4.

Presutural dorsocentrals absent or scarcely differentiated..............6.

4. Anal angle of wing evident; wings largely clouded with black but with numerous hyaline spots; oral vibrissæ present; two fronto-orbitals; occiput flat; postverticals large; pleuræ bare; tibiæ with preapical bristle. (North America.)..................*Spilochroa* Williston.

Anal angle reduced; wings hyaline, with some dark spots; no oral vibrissa; one fronto-orbital; occiput concave above; no postverticals; pleuræ hairy, one sternopleural, one mesopleural bristle; no preapical bristle on tibiæ ....5.

5. Middle of cheeks with two stout vibrissæ; no anal angle to wing. (Europe, North America.)..............................*Geomyza* Fallen.

Cheeks with short fine hairs only; anal angle small but evident. (Europe, Australia?, North America?)....................*Opomyza* Fallen.

6. At least the front tibiæ with preapical bristle on the outer side; four scutellar bristles; mesopleuræ hairy............................7.

Tibiæ without preapical bristle (in *Amphoroneura* the hind tibiæ with a weak preapical bristle); usually the basal scutellar bristles reduced or wanting; mesopleuræ bare; second vein usually extending close to the costa; postverticals usually minute or wanting; costa not spined. 12.

7. Vibrissa present; wings usually pictured............................8.

No oral vibrissæ; wings hyaline; one fronto-orbital; front and hind tibiæ with preapical bristle; arista short-plumose; abdomen slender, the second and third segments with marginal bristles; costa not spinose; anterior cross-vein before the end of the first vein; ultimate section of the fourth vein two thirds the length of the penultimate section; discal cell confluent with the second basal cell. 5 mm. (Java.)
Apsinota Wulp.

8. Base of fifth vein greatly thickened; one fronto-orbital; front tibiæ only with preapical bristle. (North America.)....*Tauromyia* Giglio-Tos.

Veins not thickened; three fronto-orbitals; postverticals present; all the tibiæ with preapical bristle...................................9.

9. The three fronto-orbitals in a single row; two acrostichals, the mesonotum densely hairy but the hairs not arranged in rows; discal and second basal cells confluent. (North America.).....*Pseudiastata* Coquillett.

Middle fronto-orbital proclinate and nearer the eye than the others are, but two of the fronto-orbitals of large size; discal cell complete; acrostichals numerous; costa spinulose.........................10.

10. Antennæ more or less projecting, not reaching the oral margin; base of anal vein present, but rudimentary..............................11.

Antennæ decumbent, the third joint twice as long as broad, reaching the oral margin; anal vein wanting; foremost fronto-orbital reduced in size; face narrow, its sides parallel; arista pubescent; the second antennal joint tipped with a short projecting bristle. (Europe, North America.).................................*Tryptochæta* Rondani.

11. Arista plumose, the hairs longer above, third antennal joint one and one half times as long as broad; the second joint tipped with a strong projecting bristle; hindmost fronto-orbital reduced in size; face as broad as either eye, widest at level of the vibrissæ. (Europe, North America.).......................................*Diastata* Meigen.

Arista pubescent; the third antennal joint short, oval; the second joint without projecting bristle; fronto-orbitals of male as in *Diastata*, of female as in *Tryptochæta*. (Europe.)...........*Euthychæta* Loew.

12. Oral vibrissæ not differentiated; eyes reniform, approaching below so as to narrow the face; arista long and loosely plumose; wings more or less pictured; four scutellars..................................13.

Oral vibrissæ present; eyes rounded, face not shield-shaped; arista short-plumose or pubescent; third antennal joint rounded; usually but two strong scutellar bristles..15.

13. Wings fasciate, only the base of the auxiliary vein present, second basal and anal cells relatively large; second antennal joint rather broad, the third joint somewhat pointed..............................14.

Wings nearly hyaline, the broad marginal cell more or less brownish; second basal and anal cells wanting; third and fourth veins converging; second and third sections of the costa equal; third antennal joint broadly oval. (South Asia.) (Tijds. ent., LIV, 423, 1911.)
Amphoroneura deMeijere.

14. Face hollowed out in the middle and elevated into a low ridge on each side and around the lower end; one pair of fronto-orbitals; two vertical, one ocellar and one postvertical. (North America.)
Scutops Coquillett.

Center of face longitudinally convex and slightly raised above the facial orbits; two pairs of fronto-orbitals, forming a transverse row, one vertical, no ocellar, no postverticals. (North America.)
Cyamops new genus.

15. Wings six times as long as broad, the hind margin broadly and strongly excised, leaving the discal cell unusually narrow; occiput convex. (North America.).........................*Mutiloptera* Coquillett.

Wings not unusually narrow, the hind margin not excised; occiput concave; front femora usually with a thorn beneath................16.

16. Wings pictured, the second vein arching forward close to the costa, the anal angle wanting; two fronto-orbitals; cheeks one tenth the eye-height; ocellar triangle large and shining. (North America.)
Ischnomyia Loew.

Wings hyaline, the second vein parallel with the costa, the anal angle more or less evident...17.

17. Two strong fronto-orbitals, in front of which is a smaller bristle, the hinder fronto-orbital behind the middle of the front; postverticals present; mesonotum more or less pollinose and with acrostichal setulæ; face and cheeks relatively broad. (Europe, North America.) *Anthomyza* Fallen.

One strong fronto-orbital at the middle of the front, with a smaller bristle before; postverticals minute or wanting; disc of mesonotum polished ....18.

18. Front opaque, the ocellar triangle not enlarged......................19.

Ocellar triangle enlarged, reaching nearly to the antennæ, it and the frontal orbits descending to include the orbital bristle highly polished, thus forming an M-shaped design on the front; arista short-plumose; two strong dorsocentrals; postverticals minute; eyes large, the lower facets enlarged, thus reducing the size of the face and cheeks. (North America.)........................*Mumetopia* new genus.

19. One dorsocentral; face shining black; postverticals minute; arista plumose; wings long and narrow. (Europe.)........*Anagnota* Becker.

Two dorsocentrals; face pruinose; no postverticals; a rounder head, more elevated thorax, shorter and broader wings with the tip less rounded, and shorter claws. (Europe.)..............*Paranthomyza* Czerny.

20. Pubescent, without macrochætæ, scutellum margined with fine bristles, cheeks broad and hairy; front hairy, produced over the antennæ as a subconical process. (Europe.)..............*Selachops* Wahlberg.

Macrochætæ developed; front not produced.........................21.

21. But two postsutural dorsocentrals present; no vibrissæ; the polished front with a broad transverse impression below the middle, and with two fronto-orbitals; no preapical tibial bristles; costa not broken and not spinose. (North America.).................*Pseudodinia* Coquillett.

Dorsocentrals usually extending in front of suture; front neither transversely grooved nor polished; fracture of costa before the end of the first vein usually distinct....................................22.

22. Tibiæ with preapical bristle; costa bristly with short spines; two fronto-orbitals; two presutural dorsocentrals; two or three sternopleurals..23.

Tibiæ without preapical bristle; costa not spinose; vibrissa small or wanting; one sternopleural; one presutural dorsocentral............24.

23. Black species; vibrissæ large; face vertical, below the epistome with an oral margin; cheeks narrower than the eye-height; antennæ normal; front pollinose. (Europe, Asia, North America.) *Trixoscelis* Rondani.

Yellow species, with yellow bristles; vibrissæ rather small; face receding below, without oral margin; cheeks nearly as broad as the eye-height; antennæ very small. (North America.).........*Zagonia* Coquillett.

24. Ovipositor lengthened, two times as long as another segment, but above deeply compressed, so that the lateral margins form narrow ridges; anal and second basal cells lacking; two fronto-orbitals; one row only of acrostichals. 1.8 mm. (Europe.).....*Pseudopomyza* Strobl.

Ovipositor not of remarkable structure; anal cell at least present......25.

25. Acrostichal setulæ and hairs of front absent or greatly reduced; bristles and hairs black; discal cell usually fused with the second basal; cross-veins rather close together; usually no oral vibrissa; one to three fronto-orbitals; upper occiput rather concave. (Europe, Asia, North America.)............................*Tethina* Haliday.

Acrostichal and frontal hairs present; hairs and bristles often yellow or white; discal cell separated from the second basal; oral vibrissa more or less differentiated......................................26.

26. Cheeks with a marginal row of hairs; face nearly vertical or projecting; cinereous species; ultimate section of fifth vein usually shorter than the penultimate section of the fourth; three or four fronto-orbitals, outwardly bent. (Europe, North America.).......*Rhicnoessa* Loew.

Cheeks hairy; face receding; ground-color yellow; ultimate section of fifth vein equal to or longer than the penultimate section of the fourth vein ....27.

27. Two or three reclinate fronto-orbitals; center of face small and deeply sunken; upper occiput flattened. (Europe, Africa, North America.) *Aphaniosoma* Becker.

Three fronto-orbitals, the front pair convergent; center of face not deeply impressed; occiput rather convex. (Europe, Asia, North America.) *Chiromyia* Desvoidy.

SINOPHTHALMUS Coquillett.

This genus is aberrant in the Geomyzinæ. It differs from all the other genera of this group before me in having the calypteres entirely without cilia; the auxiliary vein very short, entirely vanishing halfway to the costa, the costal break immediately before the end of the first vein; the costa showing a weak spot beyond the humeral cross-vein corresponding to the first costal break of other subfamilies; the basal cross-vein of the discal cell is interrupted; the lateral prolongations of the center of the face occupy a large part of the cheeks; the mesopleuræ entirely bare; and the face with central protuberance.

The genus is certainly quite similar to *Drosophila repleta* Wollaston, differing indeed only in the family characteristics, such as the separate basal cell and pubescent arista. The two are such replicas of each other, so similar in size, color, vestiture, chætotaxy, and proportions of parts, that it is hard to believe that their similarity is the result of convergence and that they should be assigned to separate subfamilies.

But a single described species.

Stout, mottled with black and yellowish; head yellow, the cheeks, sides of occiput and center of front marked with black; mesonotum centrally cinereous black, with setigerous brown spots; the pleural sutures and base and apex of the scutellum testaceous; abdomen black, except at base and on incisures; femora black except at end, tibiæ with three brown rings; wings hyaline, the cross-veins and a spot on the fourth vein brown. 3.5 mm. Cal.* (Proc. Ent. Soc. Wash., VI, 191, 1904.) *pictus* Coquillett.

SPILOCHROA Williston.

Gray pollinose, head, thorax, antennæ and legs testaceous; abdomen brownish black, irregularly mottled with white pubescence and with sparse black hairs; wings largely infumated, the base and numerous rounded or quadrate spots hyaline (see fig. 3, page 297, Williston's Manual, 3 ed.); ocellar bristles large, distant one third the width of the front; costa with short spines. 2.5 mm. (Fla., W. Ind.*) (*Peratochætus* (*Heterochroa*) *ornatus*.)........................*ornata* Johnson.

GEOMYZA Fallen.

Wings with apical spot and both cross-veins brown; mesonotum shining red; legs yellow ....2.

Wings with at least the anterior cross-vein not bordered with brown.......3.

2. Legs entirely yellow; metanotum red; female abdomen reddish, with brown bands, male abdomen sometimes reddish at base. 3–4 mm. (Eur.;* U. S., in Hough Coll.)......................*combinata* Linnæus.

Hind femora with more or less evident preapical brown ring; metanotum blackish; abdomen black, of the female reddish at tip. 3 mm. (Alaska, Wash.,* Id.,* Wyom., Cal.*) (*Balioptera*.)....*lurida* Loew.

3. Legs entirely yellow; mesonotum shining red; posterior cross-vein clouded with brown; abdomen of female shining black. 4 mm. (Eur.; Cal.) *venusta* Meigen.

Hind legs largely brown; mesonotum blackish; both cross-veins unclouded; apex of abdomen of female reddish. 3 mm. (Cal.,* Wash.*) *monostigma* new species.

Geomyza monostigma new species.

Female.—Length 3 mm. Largely blackish, shining. Back of head blackish, the anterior half of the front, the face, cheeks, antennæ and mouth testaceous; arista plumose above, pubescent below. Mesonotum blackish, except the humeri and sides; scutellum reddish; metanotum black; pleuræ dark brown, the sutures broadly reddish. Abdomen black, the apex reddish. Legs dull yellowish, the outer half of the hind femora, and a basal and apical broad ring of the hind tibiæ fuscous. Halteres white, the stem black. Wings clear hyaline, the humeral and costal cells blackish; at the tip of the marginal cell, extending across the end of the third vein, is an apical blackish spot; cross-veins not marked with a dark spot.

Two specimens. Stanford University, California, 24 April, 1910 (Wm. M. Mann); Seattle, Washington.

Structurally the species is the same as *combinata* and *lurida*.

OPOMYZA Fallen.

It is not at all certain that the following species described by Walker is a true *Opomyza*. His full description is quoted.

Testaceous, head whitish in front; thorax rather stout; abdomen with a spot on each side near the base, a dorsal spot and the apical half black; legs whitish; wings slightly grayish, with a blackish spot on the costa near the base, and another on the costa at two thirds of the length; discal transverse vein straight, parted by twice its length from the border, and by much more than twice its length from the prebrachial transverse, which is near the base. 3 mm. (U. S.) ..*signicosta* Walker.

TAUROMYIA Giglio-Tos.

The genus *Tauromyia* has been doubtfully located among the Geomyzinæ. Williston believes it can not belong here. Its size, eight millimeters, is greater than that of any other member of the group, but otherwise there is nothing radical in the description to exclude this fly from this subfamily. The head is somewhat hemispherical, the face large and vertical, the cheeks narrow and bare but furnished with long bristles along the margin of the large mouth-opening. One recurved fronto-orbital bristle. Only posterior dorsocentrals present. Wings long, the anal angle wanting, the fifth vein thickened at base.

Testaceous; face with three small black spots; front with two black spots above antennæ and ocellar triangle black; mesonotum with four brown vittæ; abdomen blackish apically, all the segments margined with brown; wings lightly yellowish. 8 mm. (Mex.) ..*pachyneura* Giglio-Tos.

PSEUDIASTATA Coquillett.

Yellow, the abdomen brown; wings hyaline, marked with six brown bands, of which five extend posteriorly from the costa and one covers the posterior cross-vein. 3 mm. (Md.) (Proc. Wash. Ent. Soc., IX, 148, 1907.) ....*nebulosa* Coquillett.

TRYPTOCHÆTA Rondani.

Cinereous brown, the front half of the wings lightly infumated; face, cheeks, anterior edge of the front, humeri, legs including coxæ and base and tip of abdomen yellow; mesonotum with four poorly defined darker vittæ alternating with more pollinose grayish stripes. 3 mm. (Wash.*) (Wien. entom. Ztg., XXX, 44, 1911.)................*micans* Hendel.

DIASTATA Meigen.

Hind cross-vein enclosed in a brown mark..............................2.
Wings hyaline, slightly infumated along the costal portion, the costal cell mostly black, the hind cross-vein slightly nearer the end of the fourth vein than the anterior cross-vein. 2.5 mm. (Wash.*) .*modesta* n. sp.
2. Costa and posterior cross-vein infumated; arista two times as long as the third antennal joint....................................3.
Brown markings of wing including the anterior cross-vein, the costa paler than the markings; arista shorter..............................4.
3. Posterior cross-vein considerably nearer the anterior cross-vein than the end of the fourth vein; thorax with four indistinct vittæ. 2.5 mm. (Martin's Falls, Canada.).......................*tenuipes* Walker.
Posterior cross-vein nearer the end of the fourth vein than to the anterior cross-vein; mesonotum not vittate; middle coxæ of male with very long hairs. 4 mm. (Eur.; Asia; N. H., Wash.*)....*vagans* Loew.
4. Wings brown, marked with three fasciæ, the first subbasal, the second between the cross-veins, starting at the second vein and interrupted or not by the discal cell, the third subapical and more or less interrupted at the fourth vein; base of abdomen with pollinose fasciæ. 3 mm. (N. J., Wisc.*)............................*pulchra* Loew.
Wings largely hyaline or subhyaline, marked with blackish spots about the costal cell, the anterior cross-vein, the posterior cross-vein extending to the third vein, and narrowly at the end of the second, third and fourth veins ....5.
5. Abdomen shining black; on each side of the middle black spot of the wings is a white spot, the basal of which extends from the third to the fifth veins, the outer from the third to the fourth veins. 2–3.5 mm. (Alaska, Wash.,* Id.,* Or.).....................*eluta* Loew.
Basal segments of abdomen fasciate with white pollen; outer white spot of wing not present. 3 mm. (Eur.; N. J., Ohio.)..*nebulosa* Fallen.

Diastata modesta new species.

Female.—Length 2.5 mm. Disc of mesonotum brownish pollinose, the notopleural suture and pleuræ cinereous; abdomen subshining, with uniform thin coating of brownish pollen. Front luteous, the orbits raised as far as the foremost bristle, merging at the minute hindmost frontal bristle with the brown-cinereous color of the occiput. Postvertical bristles large, twice as far apart as the ocellars. Antennæ yellow, the third joint one and one fourth times as long as broad, apically rounded, the black arista loosely plumose, and about two times as long as the joint. Face and cheeks white. Two dorsocentrals, eight rows of acrostichals, three supra-alars, two sternopleurals, mesopleuræ setulose with a row of six upward-directed bristles along the posterior margin. Legs including the coxæ yellow. Wings nearly hyaline, the costal cell black, the costal portion lightly infumated, no fasciæ or spottings; anterior cross-vein located under the end of the first vein, costal spines minute.

A single specimen, taken July 31, 1908, on Mount Constitution, Orcas Island, Washington.

SCUTOPS Coquillett.

Yellow, apices of palpi, two broad vittæ on mesonotum, metanotum except sides, abdomen and two interrupted bands on each tibia, black; polished, the face, orbits and notopleural suture pruinose; wings brownish outwardly, with a subapical fascia and the tip whitish. 3 mm. (Nicaragua.) (Proc. Ent. Soc. Wash., VI, 97, 1904.)
fascipennis Coquillett.

CYAMOPS new genus.

Near *Scutops* Coquillett. Head broader than the thorax, the upper occiput concave, the lower occiput convex, the head therefore longest below, but still much higher than long. Eyes reniform, vertical, the lower anterior facets enlarged so as to diminish the size of the face. Sides of front nearly parallel, that part of the front between the ocelli and the antennæ nearly twice as broad as long; two pairs of fronto-orbitals, on nearly a horizontal row, the inner pair reclinate, the outer pair proclinate; no ocellar or postvertical bristles; but one pair (the inner) of vertical bristles present. Face suddenly narrowed beneath the antennæ by the encroaching eyes, which nearly obliterate the facial orbits at the place where they pass into the genæ, the sides of the center of the face, however, vertically subparallel, this portion of the face slightly convex, expanding and rounding below without an oral margin into the large buccal cavity; clypeus (Chitinhufeisen) strongly developed, but retracted into the cavity. Cheeks about one tenth the eye-height, the genæ nearly parallel with the margin of the eye, the buccæ differentiated only as the line bearing the weak oral hairs, the lateral prolongations of the center of the face forming a triangular anterior part of the cheeks, passing into, but separated by a distinct oblique suture, from the unusually developed shining posterior oral margin; vibrissæ no larger than the oral hairs, but porrect.

Chætotaxy of the thorax as follows: one dorsocentral, two rows of fine acrostichals approximate before but diverging behind, two notopleurals, two supra-alars, four scutellars; one sternopleural centrally located, pleuræ otherwise glabrous. Abdomen very sparsely hairy, comprising six flattened segments, broad up to the last segment, which is very short and abruptly and strongly constricted for the attachment of the small genitalia. The hypopygium consisting of two vertically moving valves, from the upper of which arise two short converging processes. Legs without bristles and with ordinary hairs; the middle tibiæ tipped with a long spur. Calypteres rudimentary, fringed with but four hairs. Wings about two and one half times as long as wide; costa stopping at the fourth vein, weakened but not actually broken some distance before the end of the first vein, the second section of the costa two times as long as the third, which is twice the length of the fourth section; auxiliary vein straight, vanishing halfway between the humeral cross-vein and the end of the first vein; the first vein extending two fifths the length of the wing; third and fourth veins slightly converging, the anterior cross-vein before the middle of the long discal cell, the sections of the fourth vein proportioned about three to four, those of the fifth vein about six to one, the posterior cross-vein longer than the ultimate section of the fifth and one half the length of the penultimate section of the fourth vein; basal cells completely formed and elongate, anal vein extending one half the way to the margin of the wing.

Type species: *Cyamops nebulosa,* new species, following.

Cyamops nebulosa new species.

Male.—Length 2.5 mm. Shining, blackish, the lower part of the front opaque black, with white-pollinose orbits, the face and cheeks whitish-pollinose. Legs including the coxæ yellowish, the outer two thirds of the femora blackish, the tip of the tarsi brown. Halteres with large white knob; calypteres margined with brown. Center of wing with a large brownish cloud, the apex similarly clouded.

One specimen. Woods Hole, Massachusetts. July 7, 1902.

While this insect is markedly different from the other Geomyzinæ, yet it finds its best location here. The only other groups with which it could be confused are the Psilinæ and the Drosophilinæ.

MUTILOPTERA Coquillett.

Yellow, the abdomen black. Wings hyaline, the apex brown, which color extends half way to the posterior cross-vein; cross-veins of equal length, the posterior clouded with brown. 2 mm. (N. Dak.) (Proc. Ent. Soc. Wash., IX, 148, 1907.)................*apicalis* Coquillett.

ISCHNOMYIA Loew.

With darker spot at end of second vein, all the other veins bordered with brown; upper vibrissæ long; palpi brownish; pleuræ largely blackish; front femora with strong thorn beneath. 3 mm. (Mich.*) (Wien. ent. Ztg., XXX, 45, 1911; Williston, Manual, 3 ed., p. 80, fig. 14.) *spinosa* Hendel

Third vein broadly brown, expanding anteriorly at tip of wing, the root of the wing black, the posterior veins obscurely bordered; both vibrissæ small; palpi whitish; pleuræ whitish, with black border above; front femora beneath with a row of uniform bristles; mesonotum often with two pale stripes. 2.5 mm. (Pa., N. J., Wisc.) . *albicosta* Walker.

ANTHOMYZA Fallen.

Head, thorax, abdomen, halteres and legs, except the last tarsal joint, wholly yellow. 2.6 mm. (Eur.; Wash.*) .... *pallida* Zetterstedt.

Partly or wholly blackish .... 2.

2. Pleuræ yellow, largely or wholly; last tarsal joint black .... 3.

Pleuræ wholly black, lightly cinereous; legs entirely yellow; occiput and thorax black, abdomen brownish; halteres yellow. 2.5 mm. (Eur.; Ont.,* Ill.,* N. Mex.,* Id.,* Wash.*) .... *gracilis* Fallen.

3. Mesonotum and scutellum grayish; head, antennæ, humeri, pleuræ, venter, halteres and legs yellow. 2.5 mm. (Alaska, Wash.,* N. H.) *tenuis* Loew.

Largely yellowish; occipital spot, mesonotum with four faint vittæ, pleuræ above and abdomen with fuscous fasciæ, darker. 2.3 mm. (D. C., N. J., Ga., Cal., Wash.*) .... *variegata* Loew.

MUMETOPIA new genus.

Related to *Anthomyza* but differs in the narrower face and cheeks, the reduction of the fronto-orbital bristles, and the specialization of the interfrontalia.

Eyes large, subquadrate, the facets of the lower-front part enlarged so as to reduce the face and cheeks, the face thus at most scarcely more than one half the width of the front at its middle, and the cheeks about one tenth of the eye-height. The uppermost fronto-orbital not behind the middle of the front, at most one small fronto-orbital anterior to this. Ocellar triangle very large, glistening, reaching quite to the frontal suture; frontal orbits differentiated; upper occiput concave; postverticals minute or wanting. Two dorsocentrals; basal scutellars minute; acrostichals greatly reduced; two sternopleurals. Front femora with thorn beneath and with usual bristles; no preapicals; ungues small. Wings narrow, three times as long as wide, the anal angle not pronounced.

The pubescence of the arista is pronounced so as to be almost short-plumose. The body is polished, almost devoid of a pollinose coating.

Type: *Mumetopia occipitalis* new species.

Key to the Species of Mumetopia.

Front tibiæ and first three joints of front tarsi black; face less than one fourth as broad as the front at its middle. 1.2 mm. (Porto Rico.) (*Anthomyza.*) ....*nigrimana* Coquillett.

Legs yellow, at most the last tarsal joint black; face about one half as broad as the front at its middle....................................2.

2. Occiput with a white-pruinose spot above the neck; sides of mesonotum thinly white pruinose; pleuræ largely yellow; last tarsal joint not black; face white; mouth-parts yellow. 1.75 mm. (Ga.,* La.,* Tex.*) *occipitalis* new species.

Occiput, notum, pleuræ and abdomen entirely polished black; last tarsal joint black, contrasting with the remainder of the legs............3.

3. Clypeus, palpi and base of proboscis black; center of face dusky; third antennal joint infuscated above. 2.5 mm. (Mass.*).*nitens* new species.

Mouth-parts entirely yellow; face white; third antennal joint white. 2 mm. (N. H.) (*Anthomyza.*)...................*terminalis* Loew.

Mumetopia occipitalis new species.

Length 1.75 mm. Front black, next to the antennæ yellowish, which becomes whitish pollinose and broader on the orbits; face and cheeks white; occiput black except along the oral margin, marked with a silvery white pruinose spot just above the neck. Antennæ yellow, the third joint mostly white and white-hairy, infuscated only at the insertion of the long-pubescent black arista. Mouth-parts, including the small clypeus, yellow. Width of face one half the width of the front at its middle. A single pronounced fronto-orbital located beyond the middle of the front, with sometimes a minute bristle immediately before it. Mesonotum and abdomen shining, though very little dusted, black, the sides of the mesonotum yellowish overlaid with white pruinosity; pleuræ yellow, but with a horizontal blackish line just below the notopleural suture; two dorsocentrals, acrostichals almost entirely wanting. Halteres and legs light yellow. Wings narrow, hyaline, the veins yellow.

Seven specimens: Austin, Texas (February to November), and Opelousas, Louisiana (March). Those from the latter place were received from Dr. Hough determined as *terminalis* Loew.

Mumetopia nitens new species.

Length 2.5 mm. Shining black, the front above the antennæ, facial orbits, labella, halteres, and the legs, except the last tarsal joint, light yellow. The narrow buccæ continuing as the facialia nearly to the antennæ black; the center of the face dusky; the large clypeus and the palpi black. Antennæ yellow, the third joint dusky above; the black arista with rather long pubescence. The width of the face at its middle somewhat more than one half the width of the middle of the front. Near the middle of the front is a stout fronto-orbital, and towards the level of the antennæ is another, about one half the length of the former. Two dorsocentrals and four rows of fine but distinct acrostichals. Front femora with a pronounced thorn. Wings hyaline, veins yellow.

Three specimens, Woods Hole, Massachusetts, July 16, 1902.

This species differs from *occipitalis* in the shape of the face, position of the fronto-orbitals, structure of the mouth, as well as in color and size. It can hardly be Loew's *terminalis*.

PSEUDODINIA Coquillett.

Front below the ocelli broader than long; apices of third and fourth veins diverging; black, the proboscis, halteres, tarsi and apices of the tibiæ yellow, the thorax thinly gray pruinose. 1.5 mm. (N. Mex.) *varipes* Coquillett.

Front below the ocelli square; third and fourth veins not diverging; black, the proboscis, halteres, tarsi and apices of the tibiæ yellow............2.

2. Occiput, notum, first three segments of the abdomen, and the femora cinereous pruinose, the front femora with stout bristles. 2 mm. (Tex.*) *pruinosa* new species.

Head, mesonotum, scutellum and abdomen polished black, only the notopleural suture pruinose; femora shining black, not bristly. 2 mm. (Id.*)......................................*nitida* new species.

Pseudodinia pruinosa new species.

Male.—Length 2 mm. Black, the proboscis, end of tibiæ and the tarsi yellow, the halteres white. Front polished black, with a broad, shallow, transverse depression above the antennæ, that part of the front between the antennæ and the ocelli square, bearing two small reclinate fronto-orbitals; ocellar bristles small and distant, postverticals small and decussate. Face, cheeks and occiput cinereous-black; no vibrissæ; cheeks one sixth the eye-height. Two dorsocentrals placed well back toward the scutellum, about eight irregular rows of minute acrostichals; entire thorax cinereous pruinose. First three segments of the abdomen lightly cinereous pruinose, the remaining segments polished black. Legs rather short and robust, the femora and base of tibiæ cinereous, front femora bristly, middle tibiæ with apical spur. Calypteres white, with rudimentary fringe. Wings hyaline, veins yellowish, the auxiliary vein distinctly separated from the first throughout its entire course though approaching it before the end, the first vein there bent so as to end near the middle of the wing; costa unbroken; third vein ending near the tip of the wing; the sections of the fourth vein proportioned one to two, of the fifth vein three to one.

One specimen, Austin, Texas, May 11, 1900.

Pseudodinia nitida new species.

Female.—Length 2 mm. Slender, shining black, the proboscis, end of the tibiæ, the tarsi and the very narrow pleural sutures testaceous; halteres and calypteres white. Front shining, the transverse impression above the antennæ shallow and provided with scattered proclinate hairs, that part of the front before the ocelli nearly square; ocellar bristles small, postverticals cruciate, two reclinate fronto-orbital bristles, the anterior at the middle of the front; ocellar triangle and orbits polished, the M-shaped mark between somewhat sericeous; face short, greatly receding, carinate only between the antennæ, facial grooves broad and shallow, cheeks almost bare and about one seventh the eye-height. Mesonotum almost devoid of dust, highly polished, the humeri and the notopleural suture lightly gray-pruinose; two dorsocentrals, acrostichals rather sparse, fine and irregular; pleuræ very lightly pruinose, one mesopleural and two sternopleural bristles, no prothoracic, no setulæ. Abdomen highly polished, but the basal three segments show very sparse pollen, the last segment short and compressed. Legs short, the femora not robust, bristles of front femora fine, no tibial bristles, but the middle tibiæ with a small apical spur. Wings narrow, hyaline, whitish at base, veins becoming light brown apically; the auxiliary vein almost touching the first vein before its end, the first vein continuing straight and ending in the costa much before the middle of the wing, the costa, however, unbroken; third vein ending a little before the wing-tip; penultimate section of the fourth vein less than one half as long as the ultimate section; the sections of the fifth vein proportioned about three to one.

One specimen, Avon, Idaho, July 26, 1912.

TRIXOSCELIS Rondani.

Mesonotum whitish gray, with two indistinct brown vittæ; costal margin of wing between the first and second veins brown; four dorsocentrals; legs yellow, the coxæ and front legs dark brown; antennæ brown. 1.5 mm. (Galapagos Isl., Ariz.) (?*canescens* Loew, Eur.) (*Parodinia: Rhicnoëssa.*) ....*costalis* Coquillett.

Mesonotum cinereous; wings hyaline, the costa not bordered with brown; five dorsocentrals ....2.

2. Antennæ entirely yellow, the third joint at most infuscated..............3.

Third joint of antennæ black; legs yellow, the tarsi brownish. 2 mm. (Cal.) (*Parodinia.*)..........................*cinerea* Coquillett..

3. Front legs, except the white coxæ, black, the posterior legs yellow; pollen of upper edge of mesopleuræ slightly brownish. 2.5 mm. (Eur.; Id.,* Wash.,* Cal.,* B. C.*)......................*frontalis* Fallen.

At least the tibiæ and tarsi yellowish, or the front legs not darker than the others; thorax uniformly cinereous pollinose.....................4.

4. Legs entirely yellowish, including the coxæ; face yellowish. 2.5 mm. (Cal.,* Wash.*) (Wien, ent. Ztg., XXX, 43, 1911.)..........*prima* Hendel.

Coxæ and femora blackish, the tibiæ a little infuscated; center of face dusky. 2 mm. (Cal.) (Trans. Am. Ent. Soc., XXXIV, 100, 1908, *Siligo.*) ....*litorea* Aldrich.

ZAGONIA Coquillett.

Entirely yellow, including the hairs and bristles, except that those of the costa, the spurs at the end of each tarsal joint, the claws and sometimes the palpi are black; female with the third joint of the antennæ black, male with the antennæ entirely yellow. 2.8 mm. (Cal., Or., Wash.*) (Invert. Pacif., 27, 1904. Syn.: *Siligo oregona* Aldrich, Trans. Am. Ent. Soc., XXXIV, 99, 1908.)....................*flava* Coquillett.

TETHINA Haliday.

Vibrissal angle projecting; face one half as long as the front; three fronto-orbitals; gray-black, the front anteriorly and the face yellow. 3 mm. (Pender Island, B. C., not Idaho; Wash.) (Wien. ent. Ztg., XXX, 41, 1911.) ....*rostrata* Hendel.

Face vertical without projecting vibrissal angle; face more than one half as long as the front...2.

2. Two small fronto-orbitals; the cheeks, face and anterior portion of the front whitish yellow, the light color of the front gradually merging with the brownish vertex...3.

One large fronto-orbital; front coxæ pruinose and white, remainder of legs black; center of front orange, sharply delimited from the brown vertical triangle. 2.5 mm. (Ga., La.,* Cal.,* Wash.,* Alaska.) (*Pelomyia occidentalis* Williston.) (*Rhicnoëssa.*).........*coronata* Loew.

3. Largely olivaceous black, including all the coxæ, femora and tibiæ; tarsi black apically; antennæ mostly black. 2 mm. (Mass., R. I., Cal., Wash.,* Id.,* Alaska.) (*Rhicnoëssa.*)................*parvula* Loew.

Cinereous; legs yellow, only the femora in part cinereous and the last tarsal joint blackish; antennæ mostly yellow. 1.5 mm. (Tex.*) *maritima* new species.

Tethina maritima new species.

Female.—Length 1.5 mm. Yellowish-cinereous, bristles black. Occiput and ocellar triangle yellow-cinereous, front yellow, face and cheeks white. Antennæ yellowish brown, a little darker above, the arista pale. Mouth-parts yellow, the small clypeus black. One or two pairs of minute fronto-orbitals; ocellar bristles widely distant from each other; no postverticals. Thorax and abdomen densely yellow-cinereous pollinose, the last abdominal segment yellowish; four dorsocentrals, one presutural, one sternopleural, one mesopleural bristle. Legs including the coxæ yellow, the femora broadly diffused with the body-color, the last tarsal joint brown. Halteres yellow. Wings faintly yellowish and faintly opalescent; the penultimate section of the fourth vein two thirds as long as the ultimate section of the fifth vein.

Three specimens, Galveston, Texas, taken during the early part of June, 1900.

RHICNOESSA Loew.

Cheeks broad, fully two thirds as wide as the eye-height, the eyes relatively small and horizontally oval..................................2.

Cheeks narrow, much less than one half as wide as the eye-height, the eyes relatively larger; hairs and bristles black........................4.

2. Hairs and bristles of entire body and of the legs white; white-cinereous; the cheeks, face and front whitish in ground-color and not cinereous; the femora dusky and last tarsal joint black. 2.5 mm. (Mass., R. I., N. J.,* Tex.*)....................................*albula* Loew.

Hairs and bristles of the thorax black; cinereous black species..........3.

3. Hairs of abdomen white; front relatively broad; mesonotal pollen somewhat yellowish; legs yellow, the last tarsal joint and the apex of the femora darkened; third section of the costa only a little longer than the fourth section; penultimate section of the fourth vein a little longer than the ultimate section of the fifth vein. 2.5 mm. (West Ind.) (*Anthomyza cinerea* Williston, 1896, nec *Rhicnoëssa cinerea* Loew, 1862, from Europe, Asia and Africa.).....*willistoni* new name.

Hairs of abdomen black; front relatively narrow; thorax and abdomen cinereous; femora cinereous black, the tibiæ and last tarsal joint dark; third section of the costa much longer than the fourth; penultimate section of the fourth vein shorter than the ultimate section of the fifth. 1.75 mm. (Mass.*)................*whitmani* new species.

4. Front narrow, red, with brownish orbits becoming white next to the eyes; antennæ yellow; legs yellow, the last tarsal joint brown. 2–2.5 mm. (West Ind.) (*Anthomyza.*).................*xanthopoda* Williston.

Front broad, dull brownish; antennæ blackish; femora and tibiæ black; eyes vertically but obliquely oval. 2 mm. (Wash.*)
milichioides new species.

Rhicnoëssa whitmani new species.

Male.—Length 1.75 mm. Cinereous black, including the occiput, vertex, coxæ and femora. Front testaceous, the orbits whitish, the sides of the front slightly rounding to narrow the front below, the lowermost (fourth) fronto-orbital minute, four pairs of interfrontal bristles, postverticals convergent. Face and cheeks white, the latter two thirds as broad as the height of the horizontally oval eyes; the distance from the mouth to the root of the antennæ about one half the length of the front and vertex; oral margin with a single row of five black bristles, the foremost porrect but not otherwise differentiated as a vibrissa. Antennæ small, reddish, the outer joint a little dusky at its end, the short arista black. Proboscis dark at the base, the labella yellow; palpi yellow. Thoracic bristles rather strong, four dorsocentrals, acrostichals in four rows, lateral setulæ strong; one sternopleural, one superior mesopleural, a vertical row of four bristles along the posterior edge of the mesopleuræ. Abdomen cinereous, not at all reddish, the hind margin of the posterior segments narrowly whitish, its bristles black; hypopygium small, concolorous. Coxæ and femora cinereous black, the tibiæ blackish, the tarsi except the apical joints yellow. Halteres and calypteres whitish. Wings slender, hyaline, the veins rather dark; fourth section of the costa two thirds as long as the third section; penultimate section of the fourth vein three fourths as long as the ultimate section of the fifth, and twice as long as the posterior cross-vein; basal cells distinct, anal vein represented only by a fold.

One specimen, Woods Hole, Massachusetts, July, 1902.

I name this species in memory of Professor Charles Otis Whitman, whose name will ever be associated with the locality where the type was found.

Rhicnoëssa milichioides new species.

Male.—Length 2 mm. Black, densely covered with cinereous pollen; cheeks, face, except the epistome, and front testaceous. Antennæ piceous; the arista scarcely longer than the third joint. Proboscis long, slender, chitinized, geniculate, dark in color, the yellow slender labella as long as the middle section of the clyeus; palpi yellow, linear. Front as broad as either eye, its orbits rounding so that at the antennæ the eyes are one third closer together than they are at the level of the front ocellus; two rows of small frontal bristles, the inner row with six bristles, directed inward, the outer row with four reclinate bristles directed rather outward; the center of the front with four pairs of cruciate bristles between which there is a shallow depression; ocellar bristles proclinate, diverging and midway between the ocelli; postverticals convergent. Face deeply excavated, short, the distance from the mouth to the root of the antennæ about one third the length of the front and vertex; epistome projecting almost tuberculate below the antennæ; cheeks one third the eye-height, anteriorly projecting, with a single row of marginal bristles and with a single porrect vibrissa. Bristles and setulæ black; four dorsocentrals, acrostichal and other setulæ strong, one sternopleural, two posterior and one superior mesopleurals, two prothoracic, pleuræ loosely setulose. Six abdominal segments cinereous pruinose, the seventh segment more or less polished black and rounded. Coxæ, femora and tibiæ concolorous with the body, the tarsi, except the last joint, yellowish; bristles of front femora rather strong; middle tibiæ with strong terminal spur; pulvilli large, white. Halteres whitish. Wings nearly hyaline, with yellowish tinge; the penultimate section of the fourth vein slightly longer than the ultimate section of the fifth; costa not at all weakened at the humeral cross-vein, but broken just before the end of the first vein; basal cells distinct, anal vein entirely wanting.

Three specimens, taken on the sea beach at Alki Point, Seattle, Washington, August 2, 1908.

While this species is clearly a *Rhicnoëssa,* it bears a strong resemblance in the shape of its head to certain Milichiine genera. The narnowed front with central depression, the numerous fronto-orbitals, the short, carinate face, the lengthened proboscis and the nearly horizontal and projecting oral margin remind one of the description of *Platophrymyia.* In that genus, however, the disc of the mesonotum is not bristly.

APHANIOSOMA Becker.

A minute yellow species from the Bahamas was sent me by C. W. Johnson, with the label *Cacoxenus.* As the specimen is defective, lacking the wings, it can not be fully determined, but it is apparently very closely related to the type-species, *approximatum,* from Egypt, which was described by Becker in the conclusion of the Aegyptische Dipteren, page 187 (1903).

CHIROMYIA Desvoidy.

Entirely yellow, including the antennæ, legs, halteres, hairs and bristles, and the veins of the wings, only the small ocellar triangle black; eyes circular; about six irregular rows of dorsocentrals; scutellum with a few setulæ in addition to the regular bristles; mesopleuræ setulose. 2–3 mm. (Eur.; Afr.; N. Y., Mass., N. J., N. H., Ga., La.,* Cal.,* Wash.*) (*Scyphella.*) .... *flava* Linnæus.

Same in color, but the ocellar triangle brown; eyes horizontally oval; about four rows of acrostichals; scutellum and mesopleuræ not setulose. 1.5 mm. (Eur.;* Wash.,* Cal.*) .... *minima* Becker.

EXPLANATION OF PLATE VIII.

Fig. 1. Wing of *Leucopis griseola* Fallen, Ochthiphilinæ. Costa unbroken, auxiliary vein largely separate from the first vein.

Fig. 2. Wing of *Meoneura vagans* Fallen, Milichiinæ. Costa broken beyond humeral cross-vein and before the end of the first vein. Auxiliary vein and anal vein rudimentary.

Fig. 3. Wing of *Trixoscelis frontalis* Fallen, Geomyzinæ. Costa interrupted at first vein only.

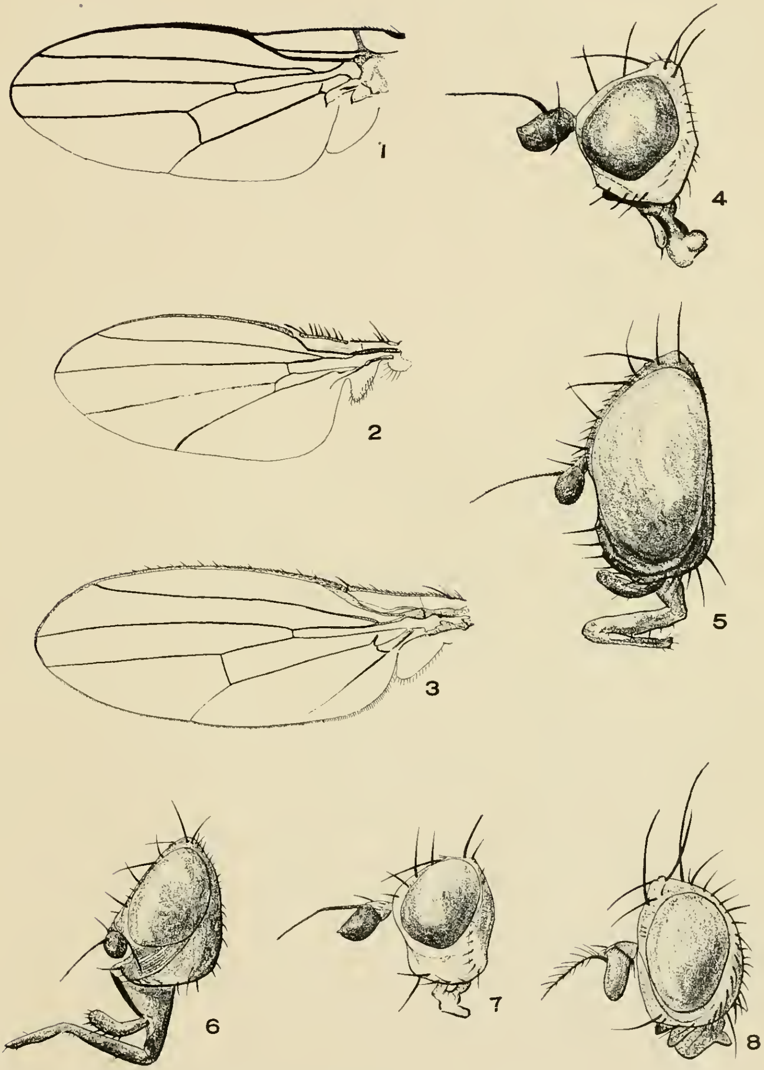
Fig. 4. Head of *Ochthiphila polystigma* Meigen, Ochthiphilinæ.

Fig. 5. Head of *Pholeomyia indecora* Loew, Milichiinæ.

Fig. 6. Head of *Madiza halteralis* Coquillett, Milichiinæ. Lower occiput extending obliquely forward, the bucca small and comprising the vibrissal angle.

Fig. 7. Head of *Cerodonta femoralis* Meigen, Agromyzinæ. Gena narrower than bucca.

Fig. 8. Head of *Diastata eluta* Loew, Geomyzinæ. Bucca narrower than gena.



North American Diptera.

SOME ACALYPTRATE MUSCIDÆ.

By A. L. MELANDER.

[Reprinted from Psyche, Vol. XX, No. 5.]

SOME ACALYPTRATE MUSCIDÆ[1]

By A. L. Melander

By an interesting coincidence Mr. J. R. Malloch, then of the United States National Museum, and I made an independent study of the small flies grouped about the Agromyzidæ. Mr. Malloch's paper on the genus *Agromyza* is to appear in the September issue of the Annals of the Entomological Society of America, while his discussion of the other genera is to come out in the Proceedings of the National Museum. The first installment of my paper was printed in the September issue of the Journal of the New York Entomological Society, which was received at the Bussey Institution, through the mails, on September 8. The remainder of this article, dealing with the Geomyzinæ is to appear in the December issue of that publication.

The following notes were made on a recent visit to the National Museum and to the Philadelphia Academy of Science, and are given as a supplement to my paper. While in Philadelphia I saw the proof sheets of Mr. Malloch's work, and while in Washington I examined his types.

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[1] Contributions from the Entomological Laboratory of the Bussey Institution, Harvard University, No. 73.

1. *Scutops* Coquillett is not a Geomyzine. The post-vertical bristles are strongly divergent; the costa is nowhere fractured; the palpi are broadly spatulate; the first vein ends at the middle of the wing and the auxiliary vein, although rudimentary, is separated from the first vein, abruptly turning forward so as to terminate near the middle of the costal cell. In addition, the lack of oral vibrissæ, the presence of the clypeus, the single pair of reclinate fronto-orbital bristles, the stiff bristles of the front femora, the absence of preapical tibial bristles; and the shortened anal vein, support its relationships with the Lonchæinæ. The center of the face is broad and flat, obliterating the facial orbits below the antennæ. The face continues on the sides so as to line the mouth-opening; the cheeks thus consisting of the face, genæ and buccæ.

2. *Pseudiastata* Coquillett belongs with the Drosophilinæ. It possesses the following characters which are at variance with typical Geomyzinæ. The costa is fractured both at the humeral crossvein and at the end of the auxiliary vein, where there is a pronounced costal spine; the discal cell is confluent with the second basal; the single frontal bristle is proclinate; there are no mesopleural bristles; and the antennæ are spaced apart.

Mr. Coquillett was apt to over-stress some certain character, such as the vestiture of the arista, and as he relied much on his analytical keys, the microscopic pubescence of the arista of *Pseudiastata* led the genus to the Geomyzinæ. A similar instance occurred with *Sinophthalmus*, which presents more Drosophiline characters than it does Geomyzine. *Pseudiastata* has the anal cell present; the calypteres ciliate; the post-vertical bristles convergent; the oral vibrissæ present; the clypeus visible and moderately developed; the cheeks consisting of the genæ, buccæ and the sides of the face; the center of the face broad and flat; the front pubescent; and the propleural bristle lacking.

3. **Spilochroa punctipennis**, sp. nov.

Male. Length 2.5 mm. Cinereous, black; body not spotted. Cheeks, face and frontal orbits white-pollinose. Antennæ brown, the third joint blackish, except near the arista; arista with very short and close pubescence. Proboscis blackish, palpi whitish. Chætotaxy as in *ornata*, the bristles long and strong: two fronto-orbitals; ocellars almost reaching the root of the antennæ; postverticals moderately long and cruciate; oral margin of the narrow cheeks with a row of five hairs, with a strong vibrissa and with a strong bristle in back; five dorsocentrals, four rows of acrostichals with about a dozen setulæ in each; one humeral; two notopleural; three supra-alar; four scutellar; one mesopleural and two sternopleural, as well as a few mesopleural and sternopleural setulæ. Abdomen setulose as in *ornata*, and with an indication of a brownish median stripe. Halteres and calypteres white, the latter with a weak white fringe. Posterior legs yellowish, front coxæ dull whitish, remainder of the front legs blackish. Wings mostly hyaline, but marked with about two dozen pale brown spots, the largest of which occur at the end of the first vein, in the tip of the marginal cell and on the posterior cross-vein. The spots are aggregated in the same general pattern as in *ornata*, but are not nearly so confluent as in that species.

The type, collected by Professor T. D. A. Cockerell at Pecos, New Mexico, July 26, is in the National Museum. Two paratypes were taken by H. S. Barber at Las Vègas Hot Springs, New Mexico, August 11 and 18.

4. Trixoscelis fumipennis, sp. nov.

Male. Length 2.5 mm. Very close to the European *T. marginella* Fallen, but differs in that the paler portion of the first and second posterior cells is not oval in outline.

Head and thorax, largely brownish-gray pollinose; front except the orbits and the rounded ocellar triangle testaceous; orbits at the antennæ reddish; face and cheeks white-sericeous; cheeks two-thirds the eye-height; antennæ reddish, the third joint largely dusky above; arista black, its pubescence microscopic; palpi yellow, proboscis reddish. Ocellar bristles reaching to the base of the antennæ. Thorax with a median brown stripe and with less evident brown vittæ bearing the dorso-central bristles; humeri and pleuræ reddish, becoming paler below; center of the scutellum a trifle darker than the sides: abdomen shining black. Coxæ, front tibiæ and posterior legs testaceous; front femora and tarsi blackish. Halteres and calypteres white. Wings largely darkly infumated, but the base, including the auxiliary cell, a narrow streak in the submarginal cell above the anterior cross-vein, the anterior portion of the discal cell, a middle stripe in the first posterior cell extending to the wing-tip, the greater part of the second posterior cell, and the anal angle, nearly hyaline; costal spines black; anterior cross-vein slightly beyond the middle of the discal cell; sections of the fourth vein proportioned three to four, of the fifth vein six to one; posterior cross-vein slightly longer than the outer section of the fifth vein.

Five specimens: Aweme, Manitoba, N. Criddle, collector, June 12, 1911. The type is in the collection of the Philadelphia Academy of Science, number 6018. Paratypes are in the collections of Mr. Criddle and myself.

Malloch[1] has described the Arizona specimens of *costalis* Coquillett as *claripennis*. This is the species I have designated as *frontalis* Fallen, which is common throughout the Pacific states. Hendel's *Trixoscelis prima* is the same as *Parodinia cinerea* Coquillett.

5. *Hemeromyia* was described by Coquillett as near *Agromyza*. It proves to be the same as the Milichiine genus I described as *Paramadiza*. Malloch's species *Hemeromyia nitens* is the same as my *washingtona*. Curiously enough the name *Paramadiza* was selected also by Malloch, as a new generic name for *Madiza halteralis* Coquillett. As the name *Madiza* is now used for the Chloropine genus *Siphonella* Macquart, the species *halteralis* is without a generic name. (See Malloch, Canad. Entom., xlv., p. 177. June, 1913.) I would therefore suggest the appropriate name *Mallochiella* for this insect and for its European congeners. The identity of the Paramadizas may now thus be tabulated.

MALLOCHIELLA nomen novum.
    halteralis Coquillett
        Desmometopa (Coquillett)
        Madiza (Hendel, Melander)
        Paramadiza Malloch
HEMEROMYIA Coquillett.
    obscura Coquillett
    washingtona Melander
        Paramadiza Melander
        Syn: *Hemeromyia nitens* Malloch

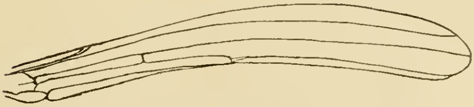

Fig. 1. *Mutiloptera apicalis* Coq., wing.

6. *Mutiloptera apicalis* Coquillett. This is a curious fly, whose body characters are evidently Geomyzine. The entire posterior portion of the wing is aborted as shown in the sketch.

September 19, 1913.

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[1] The Genus *Parodinia* Coq. (Geomyzidæ). Malloch, J. R. Ent. New, xxiv. 274–276 (June, 1913).

[Reprinted from Wisconsin Natural History Society's Bulletins Nos. 1 and 2—Vol. IV—(New Series)
April, 1906.]

THE CHEMICAL NATURE OF SOME INSECT SECRETIONS.

BY A. L. MELANDER AND C. T. BRUES.

In this paper we have attempted to give in addition to some original observations, a brief resumé of what is definitely known regarding the general chemistry of the odors of insects and myriapods.

Most of the odorous secretions of insects are the products of highly specialized glands which derive from the blood the foundation for their work. An exception to this, however, is seen in the fat occurring associated with the chitinous skeleton of insects. Of the glandular secretions one may define two categories: those used by the insect directly in its own metabolism, and those of more indirect use as an odorous character and developed to suit peculiar conditions of environment or habits. As the first group includes products found elsewhere throughout the animal kingdom, *e. g.*, the salivary, digestive, and excretory fluids, all secreted by portions of the alimentary tract, we shall pass them by to consider those substances more or less peculiar to insects themselves. These products are of two kinds; defensive, malodorous, highly volatile liquids developed principally to repel predaceous enemies; and alluring, sweet-scented or sweet-tasting fluids used to attract the two sexes of a species or the individuals of a community, or even to insure protection by other species as is the case with many myrmecophilous insects.

We are not aware that anyone has ever attempted to classify insect odors, but Kerner and Oliver ('95) p. 199, have divided the odors of flowers into the following groups: indoloid, aminoid, paraffinoid, benzoloid and terpenoid. As other scents seem to be developed in insects and some to be lacking, this classification is not wholly suited to our purpose. Accordingly, we have used the following outline in the absence of a more satisfactory one. It includes six rather heterogeneous groups: Ethereal and Benzoloid, Indoloid, Isonitrile, Vegetable extracts, Acid, Alkaline.

ETHEREAL AND BENZOLOID.

The European bugs of the genus *Pyrrhocoris* secrete a sweet smelling and pleasant tasting etheral liquid, according to Mayer ('74). The Texan ant, *Camponotus maculatus sansabeanus*, has a marked scent resembling a combination of butyric and valer ianic ethers. This we have treated more fully in the sequel, likewise the odor of *Forelius fœtidus.* The odor of the latter, as well as that of many members of the ant subfamily Dolichoderinæ, is very similar to that of rancid cocoanuts. The Harlequin bug has an odor resembling essence of *Gaultheria* or wintergreen. Many Coreidæ, notably the Squash-bug (*Anasa tristis*) possess a very characteristic odor closely resembling that of isoamylacetic ether, while the whole family Pentatomidæ have a weaker disagreeable and probably nearly related ethereal smell. Other bugs possess rather agreeable odors. The giant waterbug (*Belostoma*) gives rise to a pear or banna-like smell according to Locy. *Syromastes* also resembles a fine bergamot pear (Siebold, '48).

The water bettles belonging to the genus *Dineutes* possess the characteristic odor of apple skins, while certain Cicindelidæ are suggestive of hyacinths. The following Lepidoptera have also been described by Packard as being pleasantly odorous ('98): *Pontia napi* yields a scent like citrons, *Callidryas* gives the odor of musk, and *Dircenna* is suggestive of vanilla. Many Cerambycidæ are strongly odorous, for example the European *Aromia moschata* has a powerful smell of musk, while the closely related American *Callichroma plicatum* has a strong honey-like smell, as we have often observed, a fact first mentioned by Wheeler ('90a). The characteristic odor of the Scarabæid beetle *Osmoderma* is evidently of similar composition.

The osmateria of some Papilio larvæ secrete an etheral melon-like fluid, although this scent is usually concealed by stronger disagreeable ones. The leaf beetle, *Lina populi,* produces a secretion with an odor of oil of bitter almonds (dinitrobenzene) (Claus, '61). Candèze has suggested the presence of free hydrocyanic acid in this secretion. The large fly, *Cœnomyia ferruginea,* has a very permanent and strong odor which has been compared by Wheeler ('90a) to the juice of a species of Hypericum.

INDOLOID.

Under this grouping we find a number of insects with a fecal odor, varying greatly in intensity and modification. Of the half a dozen species belonging to the Neuropterous genus Chrysopa with which we are familiar in nature, all possess the odor of human excrement to an excessive degree. A similar odor occurs in the neotropical group of the foraging or driver ants, Eciton. We have treated in detail with the secretions of the Texan species in the second part of this paper.

ISONITRILES.

Both sexes of the large Tarantula-hawk (*Pepsis spp.*) produce a distinct isonitrile odor when first captured. This is quite noticeable, although often modified by the scent of the honey that they have eaten.

The nasutes of an African species of Ptyotermes eject a pungent stream from the head, the nature of which is thus treated by Cook ('90): "The fluid is clear and watery and does not stain the hands. A smarting sensation in the eyes and nose is also distinctly appreciable. The odor is even more disagreeably pungent and penetrating than that of Spirotreptus [a myriapod mentioned below] and has an almost nauseating quality which pervades the nests and galleries of the species and can readily be detected in houses attacked by this termite [isonitriles]. Like the secretion of Polyzonium [another myriapod referred to below] the liquid becomes sticky on exposure to the air, and the insect enemies upon which it is squirted have their antennæ stuck to their bodies and are otherwise disabled."

VEGETABLE EXTRACTS, ETC.

Large numbers of phytophagous insects acquire odors or tastes derived from their food plants, but these hardly come in line with the present discussion.

Many of the Darkling beetles, and especially those belonging to the genus *Eleodes* secrete from anal glands a fluid of an intensely disagreeable odor, which some of the species can forcibly eject for a distance of ten centimeters or more. The liquid stains the skin brown, besides having a very penetrating odor and thus resembles the secretion of *Spirobolus* (see special part). According to Williston ('84) it is soluble in water, alcohol and ether, has an acid reaction, and can be esterified to an agreeably smelling ether by means of alcohol and sulphuric acid. He suggests from this the presence of organic acids other than formic or acetic, which latter he could not detect. Our commonest species, when extracted with ether furnishes an extremely malodorous compound, suggesting extract of *Taraxicum* or opium.

The exuded blood of many Coccinellidæ has an opium-like odor (Packard '98). The species of the ant genus *Cremastogaster*, squirt from their anus a white liquid which recalls the juice characteristic of the shelf-fungi. This odor is much more intense in another ant, *Pachycondla* (*v.* special portion).

The myriapod "*Petaserpes rosalbus* secretes a considerable quantity of a milky substance which has the perfume of gum camphor." (Cope '70) (see also Banks, Science, '00, p. 649) Cook ('90) noted camphor also in *Polyzonium,* a closely related form. These seem to be the only recorded occurrences of camphor in the animal kingdom, but in the absence of chemical evidence must of course remain doubtful. The occurrence of cantharidine in members of the Meloidæ may be mentioned in this connection.

MISCELLANEOUS.

Finally, the assertion that free iodine in present is the gaseous secretion of the Paussid Beetle, *Cerapterus quadrimaculatus* must be noticed. (Loman '87). The close similarity between the purely organic secretion of the Spirobolus described in the sequel and the physical characteristics of free iodine in solution cause us to doubt Loman's observation.

ACID.

A small leaf beetle (*Notodonta*) is stated to secrete hydrochloric acid. (Denham '88). Another leaf beetle, (*Lina*) supposedly secretes Hydrocaynic acid according to Candèze ('74). It has long been known that ants produce formic acid in great quantity, while this acid is probably present in the poison of all wasps (Forel '78). The relative amount in various species of ants will be tabulated in the special part of this paper. Butyric acid as well as formic occurs in nearly all the Carabidæ associated with other substances. The whip scorpion (*Thelyphonus*) secretes acetic acid (Marx. '86) in such quantity that a stream is ejected from each side of the body which fact has earned its Mexican name of "viñagron". According to Claus ('87) the myriapod *Fontaria* secretes a fluid which contains free hydrocyanic acid. Cope ('70) and Wheeler ('90) have both demonstrated that the allied *Polydesmus virginiensis* secretes free hydrocyanic acid.

ALKALINE.

The only recorded case of a strong alkali being found in the animal kingdom is in *Dicranura,* and some other moths, which produce potassium hydroxide at the last moult in order to soften the silk of the cocoon (Latter '92 and '95). Strangely enough the larva of this same insect produces formic acid in quantity (Meldola '92).

The carrion beetles of the family Silphidæ emit from the mouth and anus a fetid liquid with an ammoniacal odor (Packard '98 p. 375) as we have frequently noticed. This is probably derived from the decomposition of its food and is not a glandular product at all.

SPECIAL PART.

Experiments with Myriapods.

For many years the repugnatorial secretion of the Julidæ has been referred to by various writers, although even yet nothing definite is known of its chemical composition. As long ago as 1870 Prof. E. D. Cope ('70) remarked that "the species of *Spirobolus* and *Julus* discharge a yellowish juice having much the smell of aqua regia and a very acrid taste. The *Spirostrephon lactarius* exudes from a series of lateral pores a fluid which has in its odor a close resemblance to creasote." Wheeler ('90) has "frequently seen our common Julus,* when irritated, emit from its repugnatory glands a brown liquid with a pungent odor not unlike bromine." More recently Cook ('00) has treated in greater detail the question of this secretion.

We quote the following from his observations: "When the liquid comes in contact with the skin a yellowish green stain results, which gradually deepens to a dull purple. * * * The alcohol in which these large diplopods are collected takes on similar colors, yellowish green at first, changing to a very deep purplish red, and has a characteristic disagreeable odor different from that of the living animal, but still in some respects suggesting it. This odor Loew considered similar to that of pyridine. * * * Direct exposure to the light and heat of the sun is also speedily fatal to many diplopoda, the heavily armored Spiroboli are often quite dead after ten or fifteen minutes' exposure. That this susceptibility may prove to be the result of some chemical change or dissociation of the stored repugnatorial fluid is apparently indicated by the fact that animals killed by exposure to the sun do not stain the alcohol as described above, the repugnatorial fluid having oozed out and having been evaporated from the surface of the segments. This suggests a further possibility that the material elaborated in the repugnatorial glands may not attain its final and effective composition until directly or indirectly acted upon by the air."

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* Probably identical with the species of *Spirobolus* here considered.

Our experiments were carried on with about a hundred large specimens of *Spirobolus marginatus* Say. Although largely negative we deem our results of interest, as they seem to be somewhat at variance with the conclusions arrived at by Dr. Cook.

The animals were forced to secrete by roughly shaking them in tepid water. By this means the *Spirobolus* were not injured and could be reserved for a future experiment. After some ten extractions they were unable to elaborate any further secretion, although they were carefully fed in the meantime. The water thus acquired a strong pungent odor and a dull yellowish color, as the secretion is very readily soluble in water. On heating for a moment to about 80 or 90 degrees the yellow completely changes to brown and the odor is greatly modified, losing its pungency. The addition of a small amount of alcohol effects a similar change, and even on exposure to the air for a few hours the water-solution undergoes the same color-changes. If the solution be shaken with ether, chloroform, benzene, or carbon disulphide while it is still in the yellow stage, the secretion readily passes into the added solvent, tinging it intense yellow, and leaving the water colorless. The extraction by ether may even be hastened by the addition of some salt.

It readily diffuses into the lower alcohols, while less rapidly into the higher, *e. g.,* amyl alcohol acquires the same tint as the water-layer above only after twenty-four hours, and never absorbs more of the secretion than the water does. After decomposition has takn place (*i. e.*, when the liquid is in the brown stage), a separation of the secretion cannot be effected by any of the named solvents.

When an ether extraction is carefully evaporated, the secretion can be obtained in its original concentration. It is then extremely volatile and pungent, irritating the eyes causing them to lachrymate, much like bromine; it has an atrociously acrid taste; stains paper, cloth, and the skin a deep yellow, which passes to a permanent brown; it is neither acid nor alkaline to indicators; it gives no reaction with $PtCl_4$, $FeCl_3$, nor concentrated HNO_3. When saponified with KOH the color changes to the greenish red noticed in the decomposed aqueous extract, while the odor disappears. The original odor can be brought back by the addition of HCl, although faintly at times. When dried in a sulphuric acid desiccator on a watch glass the secretion is absorbed by the acid, thus suggesting in connection with its peculiar odor, a nitrile; but so far all tests for nitrogen and sulphur have proved negative. If the secretion be placed in a nearly closed pipette and kept for an extended time at an exhaustion of about 300 mm., a number of small metallic, bluish-purple, spurred and acidulated scales and needles appear in the upper bulb of the tube. These lamellæ appear pink by transmitted light. Although by their luster and volatile character they suggest iodine, they give no test for this element, and are probably a polymerisation product, as they increase in number with time, even when kept at the ordinary pressure.

Unfortunately, although our *Spirobolus* were very active at first—on one occasion a large specimen ejected a decided stream a distance of ten inches—they soon showed signs of weakening, and after about ten extraction, which gradually diminished in amount during the four months of experiment, their glands refused to reproduce their secretion, although the animals seemed otherwise in good condition, and we were forced to discontinue the interesting study.

Although Loew suggested pyridine it was with the understanding that this odor might have come from the German alcohol used as the preservative. This must obviously be its source, as *Spirobolus* has quite a different odor. The facts brought forth by Dr. Cook as to the action of the air we have duplicated during our tests, and these can all be explained upon the idea of saponification. It is not the final composition that is effective as the repelling agent, as he has suggested, but the condition that obtains just before decomposition. The unstable nature of the secretion gives it great reducing power, as can be shown with alkalinated silver iodide. Its staining effects recall the secretions of Brachynus, Platynus, and their related forms among the beetles, which insects Julus greatly resembles in smell, but in addition to the staining principle these Carabidæ produce formic and butyric acids, so the secretions cannot be identical.

Experiments with Ants.

A. The relative Amount of Formic Acid present in different Species.

It has long been known that certain species of ants, *e. g.*, Formica and Lasius, secrete a considerable amount of free formic acid. This is stored up in the sac which contains the acid part of the stinging fluid in those species of Ants which have well-developed stings, while in those devoid of stings it is retained in a special sac in the posterior part of the abdomen. The following experiments were conducted with a view towards determining what amount of formic acid is present in different forms, and if the amount is constant for each species.

The ant selected for preliminary experiments was *Formica fusca*, var. *gnava* Buck., as it was evident from its strongly acid odor that formic acid was here present.

A counted number of the ants were collected in weak ethyl alcohol, and then subjected to distillation in a small flask with steam. After the distillate had ceased to show an acid reaction, a few cubic centimeters of dilute sulphuric acid were added to the flask and the distillation continued, in order to ascertain if any of the formic acid in the ants had combined with any small particles of calcareous earth that might have been present adhering to their bodies or in the alimentary tract. After removing any trace of sulphuric acid from the second distillate by means of barium chloride, it was tested for formic acid by the method given below, but not even an acid reaction could be obtained.

The first distillate was then titrated with semi-normal potassium hydroxide and its acidity noted. The solution of potassium formate thus obtained was then heated for several hours at 100 C. on a water bath with an excess of mercuric chloride solution and the amount of reduced calomel weighed. This method with mercuric chloride was found, however, to be very unsatisfactory, as it gave widely divergent results with distillates whose titration determinations were very nearly equal. The poor results thus obtained were probably due to the presence of organic matter other than formic acid, and perhaps in some cases to an incomplete reaction of the alkaline formate. But as no other acid, e. g., acetic, butyric, hydrochloric, etc., could be detected, titration with semi-normal potassium hydroxide was selected as the most reliable method.

The following table, compiled from a large series of determinations, shows the amount of formic acid in a number of species of Formicidæ. As the agreement is in most cases so close, only a few determinations are given for each species, besides several widely divergent ones that seem worthy of notice.

TABLE I.

Weight in Grams of Formic Acid Present in Ants of Different Species.

	Mercuric chloride.	Titration.	Titration.	Titration.
Formica fusca. var.gnava Bkly.				
worker.	.0004960	.0006342	*.0001854	§.0003986
female.		.0003285		
Camponotus maculatus, var sansabeanus Bkly.				
worker major.	.0005443	.002150	.002230	
worker minor.		.000448		
Camponotus fumidus Roger.				
worker major.	.0008401	.001725	.001533	.001744
worker minor.		.000414	.000418	*.000158 §.000368
Componotus americanus. Mayr.	.00009766	.0002668	.0002390	
Cremastogaster lineolata, var.clara Mayr.	trace	trace		
Pachycondyla harpax.		.000208		
Forelius foetidus. Bkly.	none	none		
Atta fervens, Say.		none		
Pheidole several spp.		none		
Pogonomyrmex barbatus. Sm.		none		
Eciton spp.		none		

* These ants were kept for a considerable time in a cloth bag in the laboratory.

§ Collected in very dry weather.

As these data are wholly independent of the size of the ants they give a poor idea of the relation between the amount of acid and the weight of the ant. This is obviated in the following table, which is derived from the one given above by dividing the actual amount per ant by the weight of the ant itself in grams.

TABLE II.

Table Showing Relative Amount of Formic Acid Per Weight of Ant in Various Species.

Formica fusca		
worker	.005	.1268
female	.030	.0109
Camponotus sansabeanus		
worker major	.041	.0534
worker minor	.009	0506
Camponotus fumidus		
worker major	.020	.0814
worker minor	.005	.0832
Camponotus americanus	.005	.0478
Pachycondyla harpax	.013	.0160

It is seen that Formica heads the list, containing more than twice as much acid relative to its size as the species of *Camponotus* examined and which follow it in the list. We believe, however, that when *Myrmecocystus* is tested in a similar way, it will show a still greater amount, as its acid odor is much more intense.

It should be noticed here that the females and males never gave any test for acid, except in a single form (female of *Formica*); also that as a rule only the species of genera which are not provided with stings showed any considerable amount of acid other than that which could be attributed to acid in the alimentary tract or in the small acid sting gland. *Cremastogaster* may prove to be an exception, but in this case most likely some other acid is present. Forelius is a stingless ant and we should expect to find it provided with acid, but it is neutral, probably because of the substitution of a peculiar ethereal secretion to take the place of the acid (see below). Pachycondyla, one of the Ponerinæ, although provided with a powerful sting, shows the presence of a considerable amount of acid. The males of no species secrete any acid, and as a general rule the females scarcely ever more than a trace.

THE DISTINCTIVE ODORS OF SOME SPECIES.

No one who has ever collected ants extensively can have failed to notice the very strong and distinctive odors possessed by many species. Other species also, which are not particularly odorous, yield peculiar scents when carefully examined.

I. ECITON.

All the species of this genus of ants which we have examined (viz: *E. cœcum, E. schmitti, E. sumicrasti, E. opacithorax, E. californicum, E. pilsoum*) possess a strikingly similar and very disagreeable odor. This odor, or one barely distinguishable from it, is secreted in even a more marked degree by species of the Neuropterous genus *Chrysopa.* In the latter insect it was long ago described by Say ('59) as closely resembling human feces.

The specimens of *Eciton* examined were subjected to distillation with steam and the first few cubic centimeters of the distillate collected. In this was found almost all the volatile odorous substance. When isolated in this manner the fecal or indoloid odor is even more pronounced than when the worker ants are crushed between the fingers. As the odor strongly suggested indol or some of its numerous disagreeably smelling derivatives, tests were made for indol by crushing some of the ants on a piece of plantinum foil with concentrated nitric acid, then evaporating to a yellow residue which turned to a yellow-brown upon the addition of a small quantity of potassium hydroxide solution. The color seems to be produced not by indol, however, but rather by the burnt chitin or animal fat, as other insects which did not have an indoloid odor gave the same result. The very delicate and characteristic test with strong hydrochloric acid and a pine splinter was also tried, but with negative results, as no red or purple color was developed. As it is not an indol and yet has a fecal odor it would seem that it must contain a leucin. Its solubility also indicates the presence of this substance since it is readily extracted from the ants by water or ether, but not at all by absolute alcohol. When an ethereal extraction of the ants is rapidly evaporated under reduced pressure a few pearly fat globules are obtained, which are in part soluble in water, while the addition of alcohol causes a globule to separate for a few moments (leucin and fat?), later to disappear. After evaporation of the alcohol from this and freezing the residue, some crystals very much resembling leucin could be observed under the microscope, although contaminated greatly and rendered somewhat obscure by the large amount of fat present in the mixture. These crystals were very distinct when the flask was cold, but as it became warmed up to the room temperature they melted or dissolved in the fat.

The original ether extraction is neither acid nor alkaline to indicators, and on saponification with potassium hydroxide gives no odor of amonia, but a smell resembling œnanthol, which most probably arises from the fat and not from the odorous principle. Thus although there is no positive evidence that the substance present in Eciton is actually leucin, nothing seems to oppose such a conclusion.

That the Eciton odor has considerable biological significance is very probable. These ants are totally blind, and migratory in their habits, so that they must depend almost entirely upon a sense of smell to follow one another about. Thus it can easily be seen how much a strong odor might be developed through the action of natural selection, from the small trace of leucin that is usually present in insect feces. (Concerning the normal presence of leucin in the alimentary tract of insects see Plateau ('73).)

II. FORELIUS FŒTIDUS.

The Texan species of this monotypical genus, like the species of Tapinoma and a few other closely related ants, has a very strong and peculiar odor which has been very aptly described by Buckley ('66), and later by Forel, as closely resembling "rotten cocoanuts."

These ants are very small and cannot be conveniently picked up by the forceps, but may be collected in almost any number by placing pieces of filter paper soaked in sugar solution near the nests. They collect on the paper to feed upon the sugar and may be easily shaken into a bottle.

When distilled with steam the odor passes over and remains dissolved in the aqueous distillate. Thus freed it retains the very evident odor of rancid cocoanuts. By saponification with potassium hydroxide solution it loses all odor, but on adding dilute sulphuric acid to excess an odor closely resembling that of *fresh* cocoanuts is developed. From this it is quite evident that the odorous principle is an ether of some sort. Attempts to identify the free acid were not successful; its odor is too pleasant to associate with any of the lower straight chain fatty acids, but may possibly be due to a forked chain one, or to a higher fatty acid. It does not seem likely that it is an aromatic acid.

III. CAMPONOTUS MACULATUS, VAR SANSABEANUS.

All the castes of this ant, and more especially the males, possess a strong, sweet pelargonic smell which very closely resembles a bouquet of valerianic and butyric ethers. The odor is at first concealed by the stronger smell of formic acid, but is very pronounced when an aqueous distillate from the ants has been neutralized with an alkali. This physiological peculiarity readily serves to separate it from *Camponotus fumidus,* an allied form which often greatly resembles it in the worker major caste, for the latter species is wholly devoid of the geranium-like odor.*

IV. FORMICA FUSCA VAR. GNAVA.

This ant, too, has its own distinctive odor, which can be readily recognized after the aqueous distillate has been neutralized with an alkali. The odor is exactly that of the mixture of sodium palmitate and oleate, which give to ordinary soap its odor.

V. CREMASTOGASTER LINEOLATA, VAR. CLARA.

The odor associated with this ant is one of the most unpleasant that we have encountered in the course of our work. At first the fresh ants have quite a strong odor strikingly similar to chlorine.

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* We are thus enabled to repeat on a small scale in the animal kingdom, the physiological separation of species by olfactory means, a thing which has often been effected by botanists with plant species, more notably among the roses (cf. Kerner and Oliver, '95).

This soon passes away, leaving an after odor suggestive of the large shelf fungus (*Polyporus.*)

VI. PACHYCONDYLA HARPAX.

Here the odor is hardly distinguishable from the fungoid smell of *Cremastogaster,* although it is not evident until the ants have been crushed.

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With Compliment
of Melander & Br

REPRINT

FROM

BIOLOGICAL BULLETIN

VOL. I. NO. 3

BOSTON, U.S.A.
GINN & COMPANY, PUBLISHERS
The Athenæum Press
1900

NEW SPECIES OF HYGROCELEUTHUS AND DOLICHOPUS, WITH REMARKS ON HYGROCELEUTHUS.[1]

AXEL LEONARD MELANDER AND CHARLES THOMAS BRUES.

THE recognition of two new species of *Hygroceleuthus* and a study of both sexes of the other American species of this genus, and of another species which has been hitherto placed in *Dolichopus*, have shown the necessity of revising this genus. Hitherto but little attention has been paid to the females, which are very difficult to separate, whereas the males present very evident characters and are easily identified.

Previous to 1868 only one species of *Hygroceleuthus* was known from North America, and three others from the rest of the world. Since then North America has produced at least eight species, making it the richest country known in species of this genus.

Hygroceleuthus and *Dolichopus* are very closely allied, their separation being effected by male characters alone. These two genera form a group distinct from other *Dolichopodidae* by the presence of a number of bristles on the upper surface of the hind metatarsi. They have in common also the first joint of the antennae hairy above, third joint short, its arista dorsal, and hypopygium free.

The so-called distinction between the two genera is to be found in the length of the face which, in the typical males of *Hygroceleuthus*, is lengthened and attains the lower corner of the eye. Subordinate to this and even less constant are the lengthened antennae, deep incision in the hind margin of the wing, and broadened wings. In the three typical species of *Hygroceleuthus*, which have tarsal ornamentation, this occurs on the middle legs. In *Dolichopus* there is no species with the middle legs similarly ornamented if we except *plumipes*. For this reason and because it shows a tendency toward the lengthened face of *Hygroceleuthus*, we have included *plumipes* in the present paper. But as this species shows strong *Dolichopus* characters in the short, stout antennae and slight costal thickening, it cannot be placed satisfactorily in either genus as they have been defined. On the other hand, the European *Hygroceleuthus diadema* merges with *Dolichopus* on account of its shortened antennae.

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[1] *Contributions from the Zoölogical Laboratory of the University of Texas*, under the direction of W. M. Wheeler, *No. 1.*

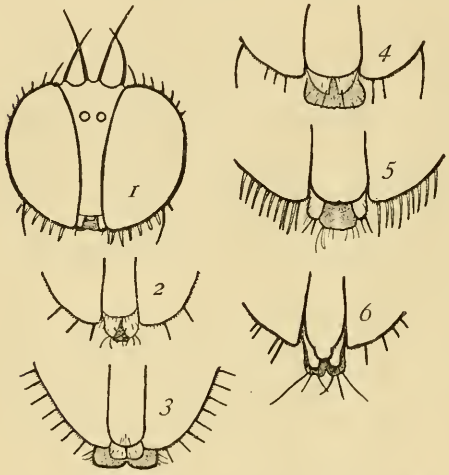

FIG. 1.—Showing length of face: 1, *Dolichopus comatus*, male; 2, *Hygroceleuthus plumipes*, male; 3, *Hygroceleuthus Wheelerii*, male; 4, *Hygroceleuthus amnicola*, female; 5, *Hygroceleuthus afflictus*, male; 6, *Hygroceleuthus latipes*, male.

The original definition of *Hygroceleuthus* included a deep incision in the hind margin of the wing and broadened wings. From these characters *Aldrichii* and *Wheelerii* deviate very decidedly.

Latipes, the only North American *Hygroceleuthus* which Loew saw, possessed no characters at variance with the typical species. It was because of limited material that Loew felt justified in constructing this genus. Like other genera founded on secondary sexual characters alone, such as *Rhagoneura* and *Spathochira* of this same group, *Hygroceleuthus* has been found invalid as the number of species increased.

From the foregoing it seems advisable that *Hygroceleuthus* be no longer retained with generic value, but may be kept as an expression for a group of the genus *Dolichopus*.

Of the previously described species of *Hygroceleuthus*, one has failed to be recognized, *lamellicornis* Thom., if indeed this be a species of *Hygroceleuthus*. The type was a female from California, but the description omitted the important points.

We have examined types of all the species except *latipes*, *plumipes*, *crenatus*, *afflictus*, and *ciliatus*. The specimens studied in the preparation of this paper are in the collection of Dr. Wm. M. Wheeler, who kindly placed his collection at our disposal.

Although the name *ciliatus* has been previously used by Walker,[1] Aldrich's *ciliatus* may remain, as Walker's species is too poorly characterized to admit of its recognition.

Males.

	Middle tarsi ornamented	2
	Middle tarsi plain	5
2.	Antennae largely black	*Aldrichii* Wheeler
	First joint of antennae yellow	3
3.	Middle tarsi strongly compressed	*latipes* Loew
	Middle tarsi not compressed, first joint feathered laterally	4
4.	Middle tibia twice length of femur	*Wheelerii*, sp. nov.
	Middle tibia not elongated, slender	*plumipes* Scop.
5.	Cilia of tegulae yellow	6
	Cilia of tegulae mostly black	8
6.	Second abdominal segment laterally with a tuft of yellow hairs	*afflictus* O. S.
	Abdomen without such tuft	7
7.	Face yellowish white	*crenatus* O. S.
	Face silvery	*idahoensis* Aldrich
8.	Arista bare	*ciliatus* Aldrich
	Arista densely pubescent	9
9.	Front coxae yellow, postocular cilia in part yellow	*consanguineus* Wheeler
	Coxae black, postocular cilia wholly black	var. *propinquus*

Females.

	First joint of antennae yellow	2
	First joint of antennae in great part black	4
2.	Species about 6 mm. first joint of middle tarsus yellow at base	3
	Species about 4 mm. Middle tarsi wholly black	*plumipes* Scop.
3.	Hind tibiae wholly yellow, vertex green	*latipes* Loew
	Hind tibiae black at tip, vertex violet	*latipes* var. *cognatus*
4.	Tip of hind tibiae black, or, if yellow, the wings narrow	5
	Hind tibiae wholly yellow	6

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[1] *List of Diptera in Collection of British Museum*, pt. iii, p. 661.

5. Front femora with the basal two-thirds infuscated *amnicola* sp. nov.
Front femora wholly yellow . . . . . *Aldrichii* Wheeler
6. Arista with slight pubescence; wings usually with a stump-vein at the bend of the fourth vein 7
Arista bare 8
7. Second joint of hind tarsi yellow at base; legs yellow; smaller species *crenatus* O. S.
Second joint of hind tarsi black; legs darker; larger species *consanguineus* Wheeler
8. Tegular cilia wholly black, somewhat robust . . *ciliatus* Aldrich
Tegular cilia yellow at sides 9
9. Wings yellowish anteriorly, coxae yellow . . . *afflictus* O. S.
Wings hyaline, coxae darker . . . . *idahoensis* Aldrich

Hygroceleuthus Wheelerii, sp. nov.

Male. Length 5 mm.; length of wing 4 mm. Shining metallic cupreous green. Proboscis piceous. Face covered with a thick dust, silvery on lower half, becoming golden towards antennae. Antennae yellow, first two joints wholly so, the third black on upper surface and outer half. First joint hairy above, and with a slight swelling on inner surface to meet the other antenna; second joint tipped with a fringe of black hairs, becoming stouter and longer on underside, nearly one-half the length of first joint when viewed from above. Third joint somewhat longer than the first, bearing dorsally a stout arista with very short pubescence. Vertex metallic violet. Postocular cilia delicate, black above and light yellow below. Thorax bright grassy green, becoming cupreous at sides and with a faint indication of the two narrow approximated median brown lines. Abdomen green, with silvery dust at sides and beneath. Posterior margins of segments becoming cupreous and margined with piceous. Hypopygium green, almost piceous, overlaid with a grayish dust. Lamellae pale, with a distinct narrow dark border and a black fringe. Internal appendages yellow. Sides of thorax glaucous; shining green when viewed from behind. Fore coxae yellow, hairy on whole anterior face and with a few bristles at tip. Middle and hind coxae yellow with outer face glaucous at basal two-thirds. Trochanters, femora, and tibiae yellow. Middle tibiae very long and thin, the proportion of femur to tibia of the middle leg being 20 to 39. Hind tibiae not incrassate, nor with smooth space on inner surface. Anterior tarsi black from tip of first joint, middle and hind tarsi black. Middle

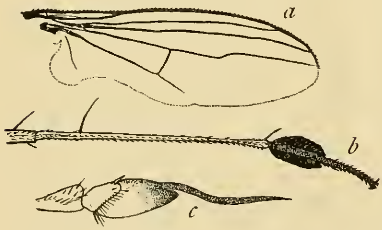

Fig. 2.—*H. Wheelerii*: *a*, wing of male; *b*, middle leg; *c*, antenna.

tarsi short, first joint broadly feathered laterally. Wings narrow, hyaline, distinctly yellowish towards costa. The usual costal swelling at tip of first vein is slight. Almost no incision at tip of fifth vein. The anal angle of wing is produced into a large distinct lobe. Veins dark. Bend in fourth vein regular. Halterés and tegulae yellow, the tegular cilia long and black.

One male specimen taken by Dr. Wm. M. Wheeler in a cranberry bog at Woods Holl, Mass., July 13, 1899.

This very distinct species is readily recognized by its lengthened middle tibiae. Aside from this the following are more or less characteristic: the reduced costal swelling and incision of the wing as well as the pronounced anal lobe; the peculiar lateral ornamentation of the middle tarsi, which are unusually short; the violet front; the light-colored antennae and finely pubescent arista; and the yellow hind tibiae.

Hygroceleuthus plumipes Scopoli.

Male. Length 3.5–4.5 mm. Length of wing 3.5–4 mm. Face yellow pollinose. Antennae yellow, third joint black at tip. First joint with a slightly prominent projection on its inner side. Arista slightly pubescent. Front metallic green. Thorax without distinct dusted bands. Abdomen metallic green above and distinctly bronzed toward the apex; white dusted at the sides and covered throughout with short black hairs. Lamellae of hypopygium narrowly bordered with fuscous. Pleurae metallic green, covered with white dust. Coxae of same color as the pleurae, except the anterior ones, which are yellow and covered with black hairs on the anterior and inner surfaces, bearing also a few black bristles at their tips. Femora yellow. Tibiae yellow, the middle pair slightly, and the posterior pair distinctly tipped with black. Middle tibiae flat, very slender except at extreme

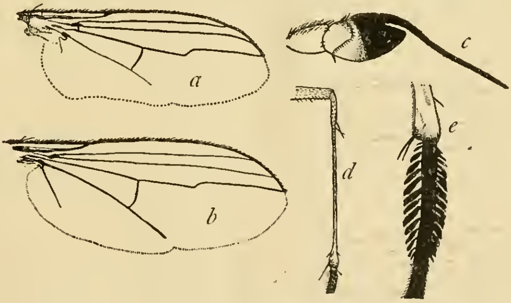

FIG. 3.—*H. plumipes*: *a*, male wing; *b*, female wing; *c*, antenna; *d*, middle tibia; *e*, middle metatarsus, male.

base and apex, which are normal in form. The flat sides each with a wide, shallow, piceous groove extending along the entire length of the tibia. Tarsi black, except basal two-thirds of anterior pair. Middle tarsi with the first joint longer than the two following and broadly feathered laterally. Wings narrow, the anterior and posterior margins subparallel, nearly hyaline. Swelling at tip of humeral vein slight, incision at tip of fifth vein slight. Tegulae with long black cilia.

Female. Length 3.5–4.5 mm. Length of wing 3.5–4 mm. Face broader, gray, greenish in certain lights and darker below. Middle tibiae and tarsi of the usual form. Anal lobe of wing more rounded than in the male, and the costa not thickened.

Twenty-three specimens examined. Sixteen males and six females, from Rabbit Ear Pass 10,000 feet, and North Park, 9000 feet, Colorado. Also one male specimen from Vancouver Island, collected by Mr. C. Livingston.

This species is readily distinguished by the peculiarly formed middle tibia and tarsus of the male. The female may be separated from *latipes* by its smaller size and wholly black middle tarsi, and from all the other species by the entirely yellow first antennal joint.

The distribution of this species is most interesting. It is one of the three species of *Dolichopus* which are common to Europe and North America. It is mostly a boreal species, being found in great numbers throughout Northern Europe, from Cape North to Switzerland. In America it was noticed by Loew from Alaska. Where *plumipes* extends toward the south it is limited to high altitudes, as witnessed in Switzerland and Colorado.

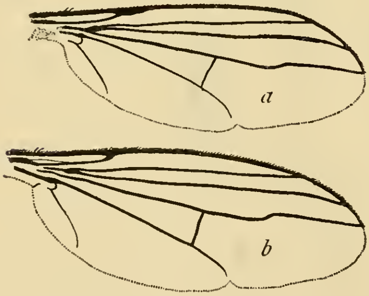

FIG. 4.—*H. latipes*: *a*, male; *b*, female.

Hygroceleuthus latipes Loew.

Male. Length 5–7 mm., of wing 4.5–6.5 mm. Face silvery, yellowish above. First joint of antennae yellow, at most slightly darkened above, long. Arista pubescent. Vertex generally green. About 6 to 8 of the supraocular cilia black, the remainder pale. Abdomen with posterior margins of the segments cupreous. Lamellae of hypopygium white with narrow black border and fringe. Anterior coxae yellow, hairy on distal portion in front. Femora and tibiae yellow. Middle tarsi compressed, ornamentation dorsal on last four joints. Wings thickened at tip of first vein and incised at fifth. Tegula cilia black, a few yellow inside.

Female. Face silvery, broader. Antennae shorter, first joint hairy above, sometimes infuscated above. Vertex green. Abdomen more cupreous, and anterior and middle tarsi slightly lighter than in the male. Posterior femora with two macrochaetae near tip on outer side. Wing incision not very deep.

This species has a greater distribution than any of the other species, except *plumipes*. It has been taken at various places in the Northern States from Connecticut to Idaho. This is the commonest species, and, aside from *Wheelerii*, the only species yet found east of the Dakotas.

Latipes, var.? *cognatus*. Two specimens vary from the type as follows and may possibly represent another species. Posterior tibiae black at tip and hind tarsi totally black. Vertex violet. Posterior femora each with only one macrochaeta on outer side near apex. One female from Woods Holl, Mass., July 19, 1899, and another female from Pullman, Ill., August 7, 1897.

Hygroceleuthus Aldrichii Wheeler.

Male. Length 4–5 mm. Face with silvery white dust below, ochreous above. Antennae black, first and second joints yellow below on mesial surface. Arista moderately pubescent. Front green. Postocular cilia white on lower two-thirds, black above. Lamellae of hypopygium yellow with black border and fringe of delicate black hairs. Anterior coxae yellow, others dark. Second, third, and fourth joints of middle tarsi distinctly compressed and fringed with stout black hairs. Anal angle of wing bilobed, costal thickening prominent and incision at tip of fifth vein slight. Tegulae with long black cilia.

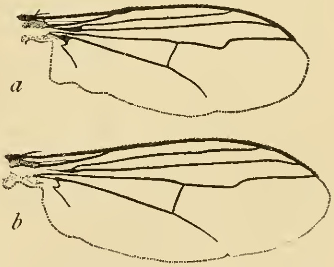

Fig. 5.—*H. Aldrichii*: *a*, male; *b*, female.

Female. Length 4–5.5 mm. Face grayish-yellow. First joint of antennae almost entirely black. Tip of hind tibiae usually black. Incision at tip of fifth vein slight. Anal angle not bilobed, and tarsi but very slightly compressed.

Numerous specimens examined, males and females. From Idaho, Wyoming, and Colorado.

The peculiar anal lobe of the male wing easily identifies this species. The female is not so easily distinguished, but can be recognized by the characters given above.

Hygroceleuthus amnicola, sp. nov.

Female. Length 4.5 mm., of wing 4.5 mm. Of a bright metallic green with cupreous reflections. Palpi light yellow with black hairs. Face evenly overlaid with golden dust. Antennae black with lower half of first and second joints yellow. The difference in color is sharply marked. First joint hairy above, with a rather large yellow projection from inner side. Second joint tipped with a fringe of black hairs which are longer below. Front metallic brassy green. Upper half of the postocular cilia black, lower pale. Thorax shining green, not much dusted in front, disc somewhat cupreous; the two narrow approximated lines are left green. Sides of thorax glaucous, becoming more piceous in all the coxae. Front coxae with black hairs on whole anterior face. Middle and hind femora yellow; fore femora black for nearly proximal two-thirds. All the tibiae yellow, infuscated at tip; the darkening especially prominent on the hind legs. Front tarsi black from tip of first joint; middle tarsi with first and second joints yellow, their tips black, remaining joints black; hind tarsi black from base of first joint. Wings long and narrow, greatly prolonged beyond tip of fourth vein; the fourth vein with a very strong bend and continued obliquely forward. Halteres and tegulae yellow, the cilia of the latter long and black.

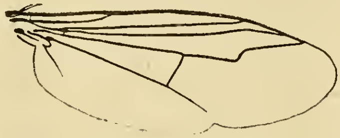

FIG. 6. — *H. amnicola*: wing of female.

One specimen, Colorado, Grizzly Creek, North Park; collected by Mr. C. F. Baker.

Although this species is represented by a single female specimen, it is so distinct that there is no hesitancy about its position. The wings reach further beyond the fourth vein; the angle of the fourth vein is more nearly rectangular; the coxae are darker and the femora blacker than in any other female *Hygroceleuthus*.

Amnicola differs from *Aldrichii* thus: middle tarsi are not compressed and are largely yellow; the front femora and coxae are much darker; the wings are hyaline and more extended beyond the veins, and the fourth vein is more sharply bent.

Hygroceleuthus crenatus O. S.

Male. Length 5–6 mm. Face yellowish-white. Antennae with the two basal joints black, except a yellow protuberance on the inner side of each. Arista densely pubescent. Postocular cilia black on upper third, yellow below. Anterior coxae yellow, with a black stripe outwardly. Femora and tibiae yellow; the hind tibiae incrassate, with a shallow, broad, brownish groove on the inner side. Anterior and middle tibiae infuscated toward the tips. Hind tarsi black except base of first joint. Lamellae of hypopygium nearly white, margined with black at the tips. Wings very broad, narrowed to the base. Costa moderately thickened, incision at tip of fifth vein moderate. Cilia of tegulae yellow, delicate, sometimes with a few black hairs intermixed.

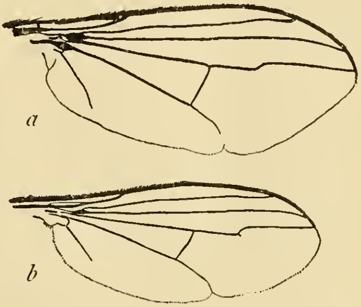

Fig. 7.—*H. crenatus: a,* male; *b,* female.

Female. Length 5–6 mm. Face uniform gray. First joint of antennae in great part black. Arista black, slightly pubescent. Hind tibiae wholly yellow, the hind tarsi with the second joint yellow at the base. Wings with a distinct incision at tip of fifth vein. A stump-vein projecting from the bend of the fourth vein, sometimes abbreviated.

Numerous male and female specimens examined from California, Washington, Wyoming, Idaho, and Vancouver Island.

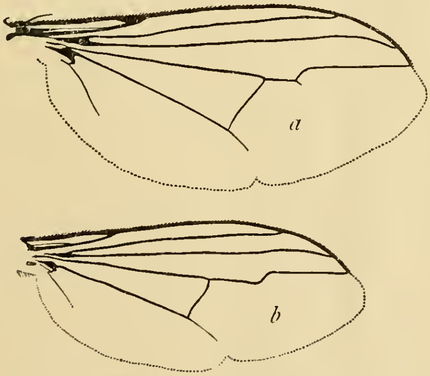

Fig. 8.—*H. consanguineus: a,* male; *b,* female.

Hygroceleuthus consanguineus Wheeler.

Male. Length 5.5–6.5 mm., of wing 4.5–5.5 mm. Upper two-thirds of face more opaque than lower third, generally with two broad vertical bands on upper two-thirds. Antennae black, in small part yellow below, and on mesial surface of first and second joints. First joint with smooth swelling inside. Arista thick, densely pubescent. Postocular cilia black, becoming thick and flat below; upper infraorbital cilia bright orange, lower black. Lamellae of hypopygium piceous with suffused black border. Legs yellow, black from tip of first tarsal joint. Hind tibiae incrassate slightly. Distal portion of fourth vein with abrupt angle and with stump-vein. Cilia of tegulae black.

Female. Somewhat smaller and with relatively longer wings. Stump-vein at angle of fourth longitudinal present. Tegular cilia black. Fore coxae with black hairs in front. The dilation of first antennal joint is less prominent. The lower postocular cilia are also parti-colored but less flattened than in the male.

This species was described from a large number of specimens collected in July, 1896, near Monterey, Cal.

Consanguineus, var. *propinquus.* Several interesting specimens received from Mr. C. Livingston, from Corfield, Vancouver Island, vary from the typical *consanguineus* as follows:

Darker. All the coxae piceous; femora piceous beneath near base. Postocular cilia black, none of the orange-colored cilia of the typical *consanguineus* present, not so many of the infraocular cilia flattened. Lamellae of hypopygium darker.

Hygroceleuthus afflictus O. S.

Male. Length 6–6.5 mm. Face white, silvery. Antennae with yellow expansion on inner side of first joint; second joint with only a vestige of yellow on the inner side. Pubescence of arista sparse but robust. Vertex green. Postocular cilia black above for a long distance, descending nearly to the middle of the eye; below light yellow. Second abdominal segment bearing on each side near the middle a tuft of long yellow hairs, directed backward and reaching to the middle of the fourth segment. Third segment with a very small similar tuft. Hind tibiae incrassate, with a broad shallow groove on the inner side. Costal thickening and incision at fifth vein of wing distinct.

Female. Length 5.5–6.5 mm. Face gray, with a greenish tinge on the lower part and slightly ochreous near the base of the antennae. Antennae dark, first and second joints in great part black. Arista bare. Abdomen without any tufts of yellow hair. Anterior coxae yellow, sometimes with a small posterior stripe dark. Hind tibiae completely yellow. Wings yellowish anteriorly, costa not thickened, notch at tip of fifth vein very pronounced. Tegular cilia black, yellow at the sides.

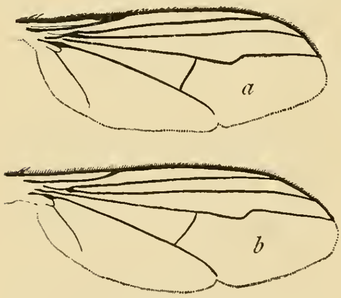

FIG. 9.—*H. afflictus*: *a*, male; *b*, female.

Numerous males and females examined from Arizona, Monterey County, Cal., and Wyoming. It was described from San Rafael, Cal., and is recorded also from Washington.

The male of this species is very easily known by the presence of the tufts of yellow hair upon the second abdominal segment.

Hygroceleuthus ciliatus Aldrich.

Male. Length 4–5.5 mm. Face yellowish-white. Front green. Antennae black, except lower half of first and second joints. Arista bare. Postocular cilia black on upper third, below nearly white. Sides of first abdominal segment with a few white hairs. Tips of hind tibiae blackish. Tarsi simple, black from tip of first joint. Wings narrow, hyaline, costa not thickened at tip of first longitudinal. Indention at tip of fifth vein slight. Tegulae with long black cilia.

Female. Length 4–5.5 mm. Face yellowish-gray. Arista of antennae bare. Hind tibiae wholly yellow. First joint of hind tarsi lighter at base. Tegular cilia black. Wings with a distinct incision at tip of fifth vein.

Numerous specimens examined from South Dakota and Wyoming.

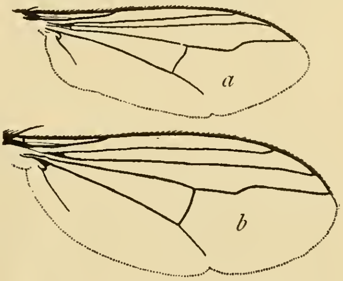

Fig. 10.—*H. ciliatus:* *a*, male; *b*, female.

Hygroceleuthus idahoensis Aldrich.

Male. Length 5.2 mm., of wing 4.8 mm. Face silvery. Antennae black, not large but with swollen yellow protuberance on inner side; second joint slightly yellow on inner side; arista rather stout. Vertex blue-green. Lamellae of hypopygium small, white, with rather wide black margin. Anterior coxae yellow with a dark green stripe on outer face, and with a few hairs on lower part. Hind tibiae incrassate with a longitudinal depression. Tarsi black from tip of first joint. Costa thickened for a long distance, the incision in hind margin slight. Tegular cilia pale, not large.

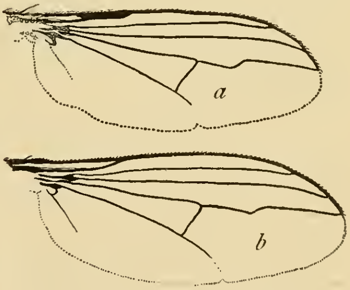

Fig. 11.—*H. idahoensis:* *a*, male; *b*, female.

Female. Face broader, darker than in the male. Anterior coxae more hairy. Wings less yellow anteriorly, costa not thickened. Tegular cilia larger, black with a slight admixture of pale ones.

Moscow, Idaho. September. The original collection numbered about seventy-five specimens.

LIST OF THE SPECIES OF THE GROUP HYGROCELEUTHUS.

plumipes Scopoli, 1763. *Ent. Carn.*, 334.
latipes Loew, 1861. *Neue Beitraege*, Fasc. viii., 5.
? *lamellicornis* Thomson, 1868. *Eugenies Resa*, 511.
crenatus Osten Sacken, 1877. *Western Diptera*, 312.
afflictus Osten Sacken, 1877. *Western Diptera*, 313.
ciliatus Aldrich, 1893. *Kan. Univ. Quart.*, 25.
idahoensis Aldrich, 1894. *Kan. Univ. Quart.*, 154.
Aldrichii Wheeler, 1899. *Proc. Cal. Acad. Sci.*, 3.
consanguineus Wheeler, 1899. *Proc. Cal. Acad. Sci.*, 5.
Wheelerii Melander and Brues, *sp. nov.*
amnicola Melander and Brues, *sp. nov.*

Dolichopus.

The following notes and descriptions were made from specimens belonging to Dr. Wm. M. Wheeler, who has not only given us his entire collection to work over, but has also tendered us much aid and advice.

The appended list is given in the hope that it may prove useful, as it contains many new localities. It is interesting to note that so many of Loew's species have been again recognized.

Dimorphism has not been noticed in the genus *Dolichopus* as yet, but a most interesting case of what may turn out to be such is to be found in the species *Henshawi* and *marginatus*. Of the more specific characters these two species possess in common the following: antennae similarly colored, vertex violet, fore coxae with dark hairs, hind tibiae with similar dark glabrous stripes, similar wing neuration, and the yellow hind femora of the male ciliated with black hairs, in which character they differ from all other dolichopodes. On the other hand, the males seem evidently distinct as follows:

Henshawi. Face generally yellow; postocular cilia darker yellow; fore tibiae incrassated at tip; fore tarsi ornamented and banded; hind tibiae not evidently darkened towards tip except a large black blotch on inner side; lamellae of hypopygium fringed with comparatively short hairs.

Marginatus. Face gray; all the legs plain; front tarsi gradually darker toward tip; hind tibiae more infuscated at apex; lamellae fringed with numerous longer hairs.

The females of these species cannot be separated. They agree rather with *marginatus* in the color of the postocular cilia and of the legs. The males, evidently so distinct, were taken, together with the females, in the same netful at Woods Holl, Mass., by Dr. Wheeler. *Marginatus* is the commoner form. In all were taken from July 14 to August 9, 1899, forty-eight females, thirteen male *Henshawi*, and nineteen male *marginatus*.

Dolichopus partitus, sp. nov.

Femora chiefly black, cilia of inferior orbit black, wings infuscated, coxae wholly black.

Male. Length 5–5.5 mm., of wing the same. Dark green with metallic lustre. Proboscis and palpi black. Face rather wide, short, concave beneath the antenna, and with a pronounced transverse ridge at its lower fourth, below this convex. Face covered with light brown pollen, except a small spot at each side of the ridge. Antennae totally black; the first joint with short bristles above; the bristles about the apex of the second joint much longer below. Third joint short, ovate, obtusely pointed at tip; arista black, pubescent. Front dark violaceous green. Postocular cilia totally black. Thorax above, dark green, with a median longitudinal dark cupreous band. Scutellum of same color as thorax. Abdomen metallic green, lighter than thorax. Surface covered with short black hairs, more sparse towards base; very slightly covered with whitish dust. Hypopygium almost black, shining with two patches of black hair on dorsal side near the base; internal appendages ferruginous. Lamellae yellow, of usual size, with a black border. Between the white center and black border is a ferruginous band. The border is very much jagged at apex and furnished with strong bristles, becoming more slender towards base. Pleurae greenish-black, covered with whitish dust; coxae black. Legs black, except femora and tibiae just at their articulation, the four anterior tibiae and the base of the first joint of four anterior tarsi. Posterior femora not ciliated. Wings infuscated about cross-vein and at apex between costa and third vein. The

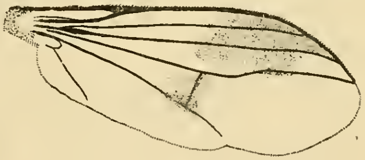

Fig. 12. — *D. partitus:* male wing.

latter spot reaches only to the second longitudinal in one specimen. Veins black; costa with an elongate swelling at the junction of the humeral vein; notch at tip of fifth vein distinct. Tegulae and halteres light yellow, the former with long black cilia.

Described from two male specimens collected in North Park, Colorado.

This species is related to *Johnsoni* Aldrich, but may be distinguished by its wide face, totally black coxae, spotted wings, and violaceous front.

Dolichopus paluster, sp. nov.

Bluish-green; antennae totally black; infraocular cilia black; tegular cilia black; legs including coxae black; tarsi not ornamented; hind femora ciliated in male.

Male. Length 5–5.5 mm. Wing 4.5–5 mm. Shining bluish-green. Proboscis and palpi piceous. Face moderately wide, between three and four times as long as the width at the middle, covered with brownish-yellow pollen, not at all silvery. Vertex dark blue-green. Postocular cilia all black. Antennae totally black; first joint with but few bristles above, those about the apex of the second joint very long below. Third joint oval, obtuse at apex. Arista black, pubescent, about twice as long as the antenna. Dorsum of thorax dark green, tinged with blue. In some specimens there is a median stripe, more blue and shining. Scutellum of the same color as thorax, fringed with short light-brown hairs. Abdomen green, distinctly bluish in many specimens, and very shining, sharply compressed towards apex and somewhat inflated near the base; destitute of light dust. Hypopygium black, shining, slightly ochreous-dusted near the base, and bearing a bunch of black hairs basally. Lamellae oval, slightly angulated inwardly, nearly white, with a sharply defined black border, fringed with black bristles which are more delicate basally. Internal appendages dark ferruginous. Pleurae black, white dusted, those of the prothorax green like the dorsum. Legs, including coxae, wholly black, fore coxae white dusted, and with short black hairs. Anterior tarsi not ornamented, about one-fourth longer than the tibiae; middle tarsi but slightly longer than tibiae. Hind femora ciliated on apical half with black hairs, the longest hairs not longer than the width of the femur at the point of their insertion. Posterior tibiae somewhat thickened. Wings grayish; veins black; costa but slightly thickened at tip of first longitudinal; fourth vein not sharply bent, approximated with the third vein at tip. Incision at tip of fifth vein slight. Tegulae and halteres yellow, tegular cilia black.

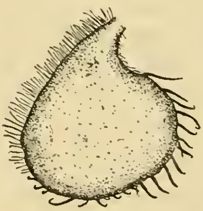

Fig. 13.—*D. paluster*: male lamella.

Female. Size same. More coppery than the male, especially on the sides of the thorax and abdomen. Face dark yellowish-gray; slightly more than twice as long as wide. Posterior femora not ciliated below, hind tibiae not thickened. The wings are brownish, darker anteriorly between the costa and second longitudinal; the veins black, very narrowly margined with brown. Otherwise like the male.

Described from five male and four female specimens, collected by Dr. Wm. M. Wheeler, in Monterey County, Cal., during July, 1896.

This species is most closely related to *corax* Osten Sacken, from which it differs as follows: lamellae nearly white, bordered with black; fore tarsi male plain. In *corax* the front tarsi are ornamented and the lamellae are nearly black, yellowish-brown in the middle only.

Dolichopus intentus, sp. nov.

Femora largely black; tibiae pale; cilia of inferior orbit dark; tegular cilia dark; wings hyaline; lamellae of hypopygium small, dusky; antennae black, third joint long, pointed, with subapical arista.

Male. Length 4 mm., of wing 3.5 mm. Dark bronzed green dusted. Proboscis dirty yellow, palpi piceous. Face thickly covered with silvery dust, except a small median spot immediately below antennae. Antennae black; first and second joints subequal; first two joints more or less shining, densely clothed with appressed short pubescence; third joint more opaque, the pubescence closer. First joint bristly; second joint with a terminal fringe of bristles which become longer beneath; third joint longer than first and second together. Arista subterminal, shorter than third antennal joint. Front violet, metallic, slightly bronze dusted. Postocular cilia black. Thorax and abdomen greenish-bronze above, becoming piceous dusted below. Hypopygium piceous dusted, shining inwardly. Internal appendages dark; lamellae small, fuscous without a distinct darker border, fringed with hairs only. Legs plain, dark, with usual bristles. Front coxae somewhat lighter than pleurae, yet silvery. Femora piceous except the yellow tip; hind femora with two ante-apical bristles. Fore and

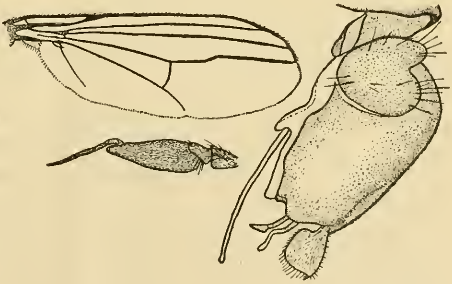

FIG. 14. — *D. intentus*: male wing, antenna and hypopygium.

middle tibiae yellow ; hind tibiae black at tip, slightly swollen along middle, but without a smooth space internally. Wings subquadrate, hyaline, third and fourth veins subparallel at tip. Wings with costa at tip of first vein thickened and without an obvious notch at terminus of fifth vein ; anal angle rounded. Tegulae and halteres yellow. Tegular cilia black.

One specimen, collected by Dr. Wm. M. Wheeler at Chicago, Ill., dated May 8, 1896.

This species is allied to *laticornis* Loew, and *incongruus* Wheeler, but is at once distinct in the structure of the antennae.

In his table of *Dolichopus*,[1] Mr. Aldrich commits *incongruus* to the section with the femora yellow. The type specimen has dark legs. Division 5 of his table may be thus altered :

5. Third joint of antennae large 5*a*
Third joint as usual, tegular cilia black 6
5*a*. Tegular cilia yellow ; hind tibiae dark on whole under surface *incongruus* Wheeler
Tibiae of hind legs infuscated towards tip 5*b*
5*b*. Tegular cilia generally yellow ; lamellae of hypopygium clear *laticornis* Loew
Tegular cilia black ; lamellae of hypopygium dusky *intentus* nov.

Dolichopus calainus, sp. nov.

Femora chiefly black, cilia of inferior orbit pale, middle tibiae black, femora yellow only at extreme tip, hind femora not ciliated, legs wholly black.

Male. Length 5 mm., of wing 4.5 mm. Bright metallic blue with greenish reflections. Proboscis and palpi piceous. Face of usual length and rather narrow ; light gray below, ochreous and darker above. Antennae totally black, third joint ovate, obtusely pointed at tip. Arista black, moderately pubescent, nearly twice as long as the antenna and inserted about the middle of the third joint. First joint but slightly bristly above, more strongly so toward the tip. Front bright blue with a decided greenish tinge. Postocular cilia black above, below the middle light. Just before the lower corner of the eye they are suddenly somewhat longer and placed very close together, forming a sort of brush. Dorsum of thorax and scutellum deep shining blue, greenish only at extreme sides and in front. Abdomen much compressed toward the apex ; shining bluish-green, whitish dusted on the sides below and covered with black hairs, which grow longer toward the apex of the abdomen. Hypopygium piceous, with several conspicuous patches of black hairs; internal appendages light brown. Lamellae small, strongly infuscated, lighter at middle; with a narrow black border which is much wider on the lower corner; fringed with black bristles which are slender, especially on the upper edge. Pleurae very dark green, grayish dusted. All the coxae black. The anterior ones silvery in front and covered with short black hairs. Legs black, slightly whitish dusted. The anterior tibiae dark brown on the inner side. All the femora at extreme tip, the tibiae at extreme base and the first joint of anterior and middle tarsi at extreme base, yellow. Wings hyaline, the veins black. Costa with a knot-like swelling at junction of humeral vein. Tegulae and halteres yellow, the former with long black cilia.

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[1] *Kan. Univ. Quart.* Vol. ii., No. 1, p. 2.

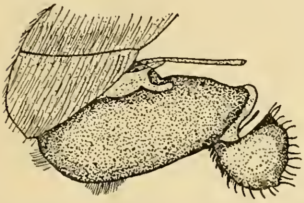

Fig. 15.—*D. calainus:* hypopygium.

Described from one male specimen collected by Dr. Wm. M. Wheeler in Chicago, May 8, 1896.

This species is related to *myosota* O. S., but may be distinguished by the lamellae of the hypopygium, which are larger, darker, wider, and distinctly angulate below.

Dolichopus enigma, sp. nov.

Dark green, shining; wings brownish in front; tegular cilia black; cilia of inferior orbit pale; femora black, hind pair of male not ciliated; fore tibiae brownish-yellow; lamellae of hypopygium subrectangular.

Male. Length 4 mm., of wing 3.5 mm. Bright green, not very shining. Proboscis and palpi piceous. Face rather wide, covered with dense silvery dust, brownish in certain lights. Antennae totally black, sericeous, but little hairy above. First joint long, second and third taken together, about twice the length of first. Arista less than twice as long as antenna, black, but little pubescent. Front dark green, not very shining. Postocular cilia black above and pale below. Dorsum of thorax and scutellum bright green, somewhat cupreous in front. Abdomen dark green, bronzed, not so bright as thorax; covered with black hairs throughout and white dusted on sides and below. Incisures between segments black. Hypopygium

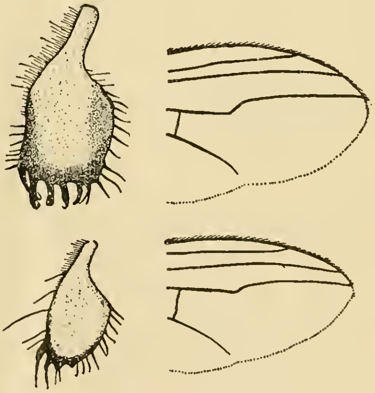

Fig. 16.—*D. enigma*, male; *D. ovatus*, male.

black, basal portion opaque, white dusted, with two patches of black hair dorsally ; towards the apex very shining. Internal appendages ferruginous. Lamellae subrectangular, dirty, translucent, white, with brown border, wider at apex, where it is jagged and bristly. Pleurae very dark green, opaque, white dusted. Legs, including coxae, totally black, except the anterior tibiae above and the base of anterior tarsi, which are more or less yellow above, femora indistinctly tipped with brownish-yellow. Tarsi not ornamented, hind tarsi with the usual bristles. Wings grayish, tinged with brown in front and along the veins ; costa with a short swelling in the angle which it makes with the first vein ; bend in the fourth vein not very abrupt ; second and third veins much approximated except at tip ; no distinct incision at tip of fifth vein. Tegulae and halteres yellow ; tegular cilia black.

One male, North Park, Colorado, over 9000 feet, collected during July.

This is closely related to *ovatus* Loew, but is distinct by the much larger subrectangular lamellae, costa with a swelling, second and third veins more approximated, and wings brownish in front.

Dolichopus agronomus, sp. nov.

Femora chiefly black, cilia of inferior orbit pale, middle tibiae yellow, first joint of hind tarsi with few bristles, hind femora ciliated with short hairs.

Male. Length 3.5 mm., of wing 3 mm. Dark metallic green. Proboscis and palpi piceous. Face very long, densely covered with bright silvery pollen, which continues past the antennae as far as the frontal bristles. Above the antennae it is greenish-white and not so dense. Antennae long, totally black, the first two joints short, the third large and broad, elongated ovate and rather sharply pointed. Arista black, pubescent, a little longer than the antenna. Postocular cilia black above, pure white below. Thorax bluish-green, covered with very fine white dust. A median shining stripe is not at all dusted. Abdomen very strongly compressed toward apex, dark green, white dusted, especially along the sides. The extreme basal and apical margins of the segments more or less free from the dust. Entire abdomen covered with short black hairs. Hypopygium black, shining, covered at base with white dust. Internal appendages light yellow. Lamellae nearly white with an indistinct narrow blackish border ; elongate oval. Each lamella nearly bilaterally symmetrical, but little angulate inwardly and beset with the usual bristles. Pleurae greenish-black, dusted with gray. Coxae of same color as the pleurae, all tipped with yellow, the

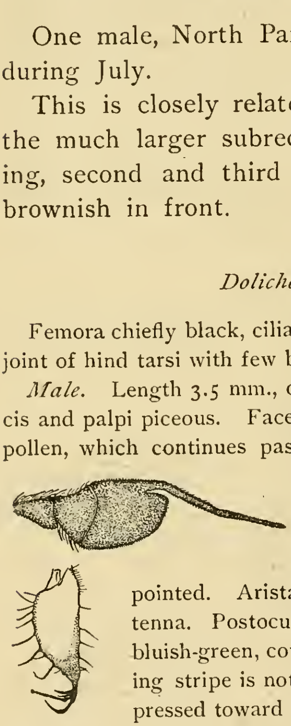

Fig. 17.—*D. agronomus*: male antenna and lamella.

anterior ones silvery in front. Femora brownish-black, tipped with yellow. Anterior and middle tibiae yellow, the anterior ones lighter. Posterior tibiae and tarsi deep black, the former yellow at extreme base. Anterior and middle tarsi blackened from the tip of first joint. Wings oval, much narrowed toward the base, hyaline, the veins dark brown. Costal swelling and incision at tip of fifth vein not well marked. Tegulae and halteres yellow. Tegular cilia yellow, with a couple of strong black ones intermixed.

Described from one male specimen, collected by Dr. Garry deN. Hough, at New Bedford, Mass., June 8.

From *convergens* it differs by the vertex being white pollinose, as well as the face. Also the hind femora are ciliated with short hairs; the hind tibiae are totally black; the lamellae of the hypopygium are oval, and the third and fourth veins of the wing converge less strongly.

From *albiciliatus* it differs by the smaller size; longer third antennal joint, and the black hind tibiae. Moreover, the ciliation of the hind femora of the male is shorter; the lamellae are not broad and rounded, and are much lighter in color.

From *xanthocnemus* it can be readily distinguished by the shorter ciliation of the hind femora and the black hind tibiae.

This is a very peculiar species and superficially resembles the species of the group *Hygroceleuthus*, although it is otherwise quite different.

Dolichopus pernix, sp. nov.

Green; face whitish; antennae black, arista plain; infraocular cilia white; tegular cilia black; feet yellow, including fore coxae, tip of hind tibiae conspicuously black; last two joints of male fore tarsi moderately enlarged, black; fourth longitudinal vein not broken.

Male. Length 4.75 mm., of wing 4.5 mm. Green, shining. Proboscis piceous, palpi yellow. Face narrow, silvery white, flavescent towards antennae. Antennae wide, black, first joint dark brown below; joints subequal; second and third together ovate; third obtusely pointed; arista dorsal, sericeous, longer than antenna, inserted at middle of third joint. Vertex shining green. Postocular cilia except upper five white. Thoracic dorsum green, more or less shining, towards front and sides brassy. Abdomen shining green, sparsely silvery dusted above, becoming thickly at sides and below, cupreous towards tip. Hypopygium piceous, dusted, greenish towards base, shining on inner surface. Lamellae elongate,

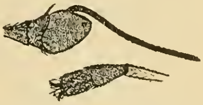

Fig. 18.—*D. pernix:* male antenna and tip of fore tarsus.

light yellow, narrowly margined with black, fringed with dark hairs, inner and apical angle prolonged into several long filaments. Pleurae glaucous, in different parts green, cupreous or piceous, according to angle of vision. Middle and hind coxae piceous, glaucous. Fore coxae yellow, piceous and dusted basally on posterior face; front surface besides the strong apical bristles with fine dark hairs which are supplanted by lighter ones on proximal portion. Legs yellow except apex of hind tibiae, hind tarsi, and last two joints of front tarsi. The middle and front tarsi increase in density of color from tip of first joint. Hind femora not ciliated, with a subterminal bristle. Hind tibiae not glabrous inwardly. Front tarsi slender, as are the tibiae, nearly twice the length of the tibiae; first joint longest, a little shorter than two following; second and third subequal, fourth shortest, fourth and fifth together about equal to third; fourth and fifth joints flattened. Empodia distinct, yellowish. Wings long, hyaline; costa with a small tubercle at juncture of first vein; third vein converging towards fourth; bend in fourth vein slight; at tip of fifth vein a broad, shallow sinus; anal portion moderately prominent. Tegulae and halteres yellow, the former with long black cilia.

One male taken by Mr. Clermont Livingston at Corfield, Vancouver Island, May 21, 1896.

Though closely related to *discifer*, it appears quite distinct. The more evident points of difference are these:

Pernix: First antennal joint not red beneath; arista inserted near middle of third joint of antenna; numerous dark hairs on anterior face of fore coxae; tip of hind tibiae evidently black for some distance; fourth tarsal joint flattened, black; wings not evidently narrowed at base.

Discifer: First antennal joint reddish on under side; arista beyond middle of third antennal joint; front coxae with white hairs (dark hairs on inner side of female, only); hind tibiae dark at only extreme tip and less on outer side; fifth tarsal joint only black; wings rather narrowed towards base.

The proportion of the tarsi to the tibiae is also different, as is also the comparative length of the tarsal joints.

Dolichopus pantomimus, sp. nov.

Green; face narrow, light brown; antennae black with simple arista; cilia of inferior orbit pale; cilia of tegulae black; feet yellow, including front coxae and excepting tip of hind tibiae and tarsi, not ornamented in the male excepting femoral brush; fourth vein not broken.

Male. Length 4 mm., of wing 3 mm. Bright metallic green, somewhat brassy. Proboscis piceous, palpi ferruginous at tip with few dark hairs. Face very narrow, with eyes almost contiguous at middle, thickly overlaid with ferruginous dust, shining. Antennae black, sericeous, not noticeably bristly; second joint closely applied to the third; first joint equal to second on inner side; third joint long, pointed, equal to first two together. Arista finely pubescent, arising from middle of upper surface of second and third joints taken together. Vertex green, shining. Infraocular cilia white. Thorax with dorsum bright green, cupreous anterior to wing insertion, dusted in front; with an indication of two brown median longitudinal lines in front. Abdomen dorsally bright green, cupreous tinged; the posterior margins of segments blackened. Hypopygium wholly piceous, somewhat shining, and finely sericeous. Lamellae in length equal to antennae, white translucent, with a jagged, moderately wide black apical border, and closely fringed with black hairs at tip. Pleurae, sides of abdomen, and base of posterior fore coxae dark green, glaucous. Fore coxae wholly yellow, rather sparsely beset with pale hair, besides the apical bristles. Legs plain, yellow; hind femora with an ante-apical bristle and ciliated below with not long yellow hairs; hind tibiae stouter than the others, and with a long glabrous streak on hind surface, black at tip for one-seventh its length; hind tarsi entirely black, anterior pairs darker towards tip, but not black. Empodia very small, silvery. Wings narrow, tinged somewhat dark gray; costa, at tip of first vein, with an evident knot; fourth longitudinal vein not broken; hind margin entire at tip of fifth vein; anal angle rather strong.

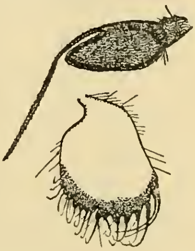

Fig. 19. — *D. pantomimus*: male antenna and lamella.

A single male from New Bedford, Mass., collected May 30, by Dr. Garry deN. Hough.

Related to Loew's *melanocerus*, but differs in the smaller size, color of the hairs of the fore coxae, which are not black at base, anterior tarsi not black, and the narrowed darker face.

Dolichopus renidescens, sp. nov.

Green; shining; face broad, light brown, antennae black, with a plain arista; vertex violet; cilia of inferior orbit white, of tegulae black; legs yellow, except tips of the tarsi and hind legs from outer portion of hind tibiae, not ornamented except the ciliation of hind femora; fourth vein not broken.

Length 4.5–5 mm., of wing the same. Bright green, shining, darker on thoracic dorsum, almost bluish. Proboscis piceous, palpi brunneous. Face broad. Antennae dull black, sericeous, short, with slender, dark, sericeous arista, once and a half the length of the antenna; third joint a little shorter than the first two together, broadly oval, rounded but obtusely pointed at apex; second joint with circlet of hairs. Front violet. Upper seven of postocular cilia black, rest pale yellow. Thoracic dorsum bluish-green, brilliantly shining except for indications of longitudinal dusted rows; scutellum and ante-scutellar region purer green. Abdomen shining green, with brassy tinge, lightly dusted. Pleurae glaucous on a green foundation. Middle and hind coxae, except tip, and extreme base of fore coxae of same color as pleurae. Front coxae with black pubescence on anterior face. Legs largely yellow, the hind femora with two ante-apical bristles; fore and middle legs dark from tip of first tarsal joint; hind tarsi black, hind tibiae infuscated at tip. Wings hyaline, normal, a slight sinus at tip of fifth longitudinal. Tegulae yellow with rather long black cilia. Halteres yellow.

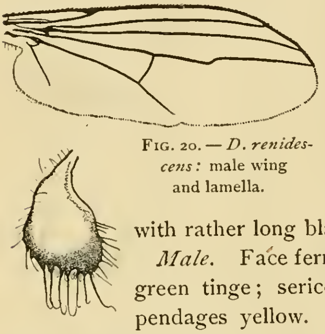

FIG. 20. — *D. renidescens*: male wing and lamella.

Male. Face ferruginous. Hypopygium piceous with brassy green tinge; sericeous below, shining inwardly; internal appendages yellow. Lamellae clavate, broad, white translucent, rather broadly margined with black at extremity, apex jagged and fringed with rather long, slender, nearly straight, black hairs. Hind tibiae with a long, narrow glabrous streak, more evident near tip, on hind face. Anal angle of wing full; costa thickened at junction with humeral vein.

Female. Face with gray dust. First antennal joint a little longer than in male. Hind tibiae not glabrous, the apical infuscation not evident. Anal angle of wing rounded; costa not thickened.

Two males and one female from North Park, Colorado, collected at an altitude of over 9000 feet during July.

The shorter antennae, broader face, violet front, more extended margination of hypopygial lamellae, and the closer ciliation with brown hairs of the hind femora which possess two ante-apical bristles, distinguish this species from *melanocerus* Loew.

Dolichopus apheles, sp. nov.

Green; face ochraceous; antennae black, with a simple arista; infraorbital cilia white; tegular cilia black; feet plain, yellow, except tips of hind femora and tibiae black; hind tarsi black; fore coxae yellow with dark hairs; fourth longitudinal vein not broken.

Male. Length 5 mm., of wing 4 mm. Not so brightly colored as in most species, largely green. Proboscis piceous, palpi roseous yellow. Face ochraceous. Antennae sericeous, black, except underside of first joint, which is indistinctly reddish, very like those of a female *Hygroceleuthus;* first joint longer than second, short, hairy above; second with a crown of black bristles; third short, deep, subtriangular. Arista sericeous. Vertex blue green in certain lights, violet in others, somewhat shining. Infraocular cilia pale; six of the supraocular cilia black. Thorax dull, bluish on dorsum; posterior declivity and scutellum shining green. Abdomen shining green dorsally, cupreous toward apex, transverse margins of segments piceous. Hypopygium piceous with greenish tint, shining, and not sericeous on inner face; lamellae rounded, rather short, white translucent, with a narrow, black, apical border, jagged and fringed with black hairs. Pleurae glaucous, as are the middle and hind coxae, except tips. Front coxae yellow with a basal glaucous-piceous spot on the outer side; front surface with a coating of short black hairs, besides apical bristles. Legs yellow, entirely unornamented; the darker places are: hind tarsi and outer fourth of hind tibiae black, tip of hind femora more evidently on upper surface black; the infuscation of fore and middle tarsi begins at middle of first joint. Hind femora with a single ante-apical bristle and not ciliated beneath; hind tibiae with no evidently glabrous space. Wings normal, rather dusky anteriorly; without costal thickening at tip of first vein; fourth vein unbroken, beyond bend gradually converging with third, but almost subparallel with it; no indention in posterior margin; anal angle full. Tegulae and halteres yellow, tegular cilia black, rather short and stout.

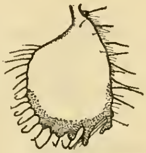

Fig. 21. — *D. apheles:* male lamella.

One male collected by Dr. Wm. M. Wheeler near Milwaukee, Wis., June 28, 1895.

This unique species is allied nearest to those species grouped about *melanocerus* Loew and *incisuralis* Loew.

The addition of the last four species has necessitated the following modification of Divisions 52 to 56 of Professor Aldrich's table.[1]

52. Front legs of male ornamented 2
Front legs plain 3
2. Fourth joint of fore tarsi of male not flat . . . *discifer* Stan.
Fourth joint of fore tarsi of male flat, black . . *pernix* sp. nov.
3. Antennae wholly black; hind femora of male ciliated . . . 4
First antennal joint lighter below 6
4. Front coxae with light hairs . . . . *pantomimus* sp. nov.
Front coxae with dark hairs in front 5

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[1] *Kan. Univ. Quart.* Vol. ii, No. 1, p. 5.

5. Face rather narrow; front green . . . . *melanocerus* Loew
Face broad; front violet . . . . . . *renidescens* sp. nov.
6. Femora of hind legs of male ciliated, not blackened 7
Male hind femora not ciliated, black at tip . *apheles* sp. nov.
7. Front coxae with black pubescence 8
Front coxae with white pubescence . . . *platyprosopus* Loew
8. Bristles of hind tibiae long . . . . . . *setosus* Loew
Bristles of hind tibiae normal . . . . . *incisuralis* Loew
56. *praeustus*, etc.

Dolichopus amphericus, sp. nov.

Light green; antennae yellow, except third joint and tip of second; fore tarsi ornamented; femora yellow; postocular cilia pale below; tegular cilia black, hind tibiae not black at tip.

Male. Length 6.5–7 mm., of wing 5.5–6 mm. Light coppery green with much white dust. Proboscis piceous, palpi testaceous. Face of medium width, about four times as long as broad, thickly covered with brilliant yellow dust. Front shining green. Antennae rather elongate; first joint yellow, with many short black hairs above; second joint yellow at base, becoming black at apex; third joint black, sericeous, obtusely pointed at apex. Arista less than twice as long as antenna, very distinctly pubescent. Postocular cilia black above and light yellow on lower three-fourths. Thorax light green, coppery on the disc; slightly opaque by the presence of light yellow dust. Dorsally there is a deep coppery longitudinal stripe. Abdomen shining green, white dusted. The white dust is so thick as to obscure the ground color on the lower part of the sides. Incisures coppery. Hypopygium black, shining, except at base, where it is white dusted. Near the base bearing a large patch of black hair. Internal appendages ferruginous; lamellae very pale yellow, with a wide, sharp border of black at apex, where they are bristly and deeply toothed. Outer tooth bearing at its tip a strong, curved bristle. Pleurae greenish-black,

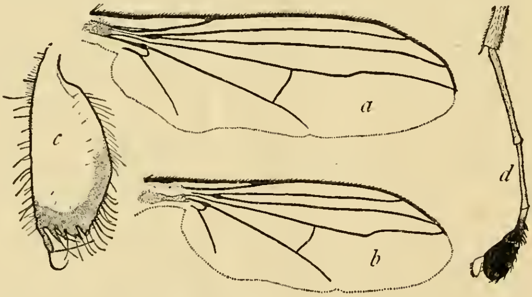

Fig. 22.—*a*, *D. amphericus*, male wing; *b*, *D. coloradensis*, male wing; *c*, *D. amphericus*, lamella; *d*, *D. amphericus*, male fore tarsus.

white dusted. Fore coxae yellow with white pubescence in front, at apex and inwardly with black hairs. Middle and hind coxae of same color as the pleurae, yellow only at extreme tip. The middle pair with white hairs in front. Legs yellow. Fore tarsi ornamented; the first two joints long and slender, first about once and a half the length of the second; third less than one-half the length of the first, much enlarged at apex, where it is infuscated; fourth joint small, shorter than the third, flattened, velvety black; fifth oval, about one-half as long as the first, broadly compressed, deep black and fringed on anterior edge with black hairs; empodia silvery white. Middle tarsi infuscated from tip of first joint. Hind femora not ciliated; hind tibiae wholly yellow with a dorsal, apical, glabrous stripe; hind tarsi wholly black. Tegulae and halteres yellow; tegular cilia black. Wings narrow, nearly hyaline, slightly brownish in front; costa with no noticeable swelling; fourth vein not broken; distinctly lobed at tip of sixth vein.

Female. Length 5.5–6.5 mm., of wing 6.25–6.75 mm. Face yellowish-gray. Front tarsi plain, infuscated from tip of first joint, the second and third joints lighter at base, giving the tarsus a somewhat banded appearance. Wings darker and longer than in the male; only a faint indication of the preanal lobe.

Two males and three females from Price County, Wis.; collected by Dr. Wm. M. Wheeler.

This species resembles *coloradensis* Aldrich, from which it differs by the larger size, bright yellow face, lighter antennae, brownish wings, and white hair on front face of anterior coxae.

Together with *flagellitenens* Wheeler, *amphericus* possesses greatly enlarged metapleurae which give a winged appearance to the first abdominal segment. The posterior portion of the metapleurae is dull black and pubescent.

The following localities are those of species in the collection of Dr. Wm. M. Wheeler:

Group *Hygroceleuthus*.

latipes Lw. Wisconsin, Illinois.
var. *cognatus*, Illinois, Massachusetts.
Aldrichii Wheeler. Idaho, Wyoming, Colorado.
plumipes Scop. Colorado. Vancouver.
Wheelerii M. *et* B. Massachusetts.
amnicola M. *et* B. Colorado.
crenatus O. S. Vancouver, California, Washington, Wyoming, Idaho.
consanguineus Wheeler. California.
var. *propinquus*. Vancouver Island.
afflictus O. S. Arizona, California, Washington.
ciliatus Ald. Wyoming, South Dakota.
idahoensis Ald. Idaho.

Group *Dolichopus*.

partitus M. *et* B. Colorado.
paluster M. *et* B. California.
laticornis Lw. Wisconsin, Wyoming.
intentus M. *et* B. Illinois.
incongruus Wheeler. Wisconsin.
gratus Lw. Illinois, Wisconsin.
calcaratus Ald. Massachusetts.
detersus Lw. Illinois, Wisconsin.
myosota O. S. California.
calainus M. *et* B. Illinois.
acuminatus Lw. Illinois, Wisconsin.
ovatus Lw. Wisconsin.
enigma M. *et* B. Colorado.
setifer Lw. Wisconsin, Massachusetts.
albiciliatus Lw. Massachusetts, Illinois, Wisconsin.
agronomus M. *et* B. Massachusetts.
xanthocnemus Lw. Vancouver Island.
pachycnemus Lw. Massachusetts.
longimanus Lw. Wisconsin, Massachusetts.
albicoxa Ald. Massachusetts, Illinois.
brevimanus Lw. Massachusetts, New Hampshire.
socius Lw. Massachusetts, New Jersey, Wisconsin.
palaestricus Lw. Illinois, New Hampshire.
splendidus Lw. Ontario, Michigan, Illinois.
splendidulus Lw. Illinois, New Hampshire.
batillifer Lw. Massachusetts.
tonsus Lw. Massachusetts.
tener Lw. Wisconsin.
variabilis Lw. Illinois, Wisconsin.
lutiepennis Lw. Vancouver Island.
bifractus Lw. Massachusetts, Illinois, Nebraska.
obcordatus Ald. Wyoming, Idaho.
ramifer Lw. Illinois, Texas, Wyoming.
vittatus Lw. Illinois, Wisconsin.
cuprinus Wied. Illinois, Wisconsin, Wyoming.
longipennis Lw. Vancouver Island.
flagellitenens Wheeler. Illinois, Wisconsin.
comatus Lw. Massachusetts, Illinois, Wisconsin.
pernix M. *et* B. Vancouver Island.
melanocerus Lw. Massachusetts.
pantomimus M. *et* B. Massachusetts.
renidescens M. *et* B. Colorado.
apheles M. *et* B. Wisconsin.
setosus Lw. Massachusetts, Vancouver Island.
gracilis Ald. Wisconsin.
angustatus Ald. Massachusetts.
lobatus Lw. Illinois, Wisconsin, Michigan.
coloradensis Ald. Colorado.
amphericus M. *et* B. Wisconsin.
Henshawi Wheeler. Massachusetts.
marginatus Ald. Massachusetts, New Jersey.
scoparius Lw. Massachusetts, Illinois, Wisconsin.
canaliculatus Thomson. California.
duplicatus Ald. Idaho.
Coquilletti Ald. Idaho, Vancouver Island.
tenuipes Ald. Idaho, California.
occidentalis Ald. Idaho, Vancouver Island.
scapularis Lw. Wisconsin.
germanus Wheeler. Wisconsin, Wyoming.
grandis Ald. California.
sexarticulatus Lw. Illinois, Louisiana.
Willistonii Ald. Kansas.
terminalis Lw. Wisconsin.
sarotes Lw. Wisconsin.

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GUESTS AND PARASITES OF THE BURROWING BEE HALICTUS.

AXEL LEONARD MELANDER AND CHARLES THOMAS BRUES.

[Reprinted from BIOLOGICAL BULLETIN, Vol. V., No. 1, June, 1903.]

GUESTS AND PARASITES OF THE BURROWING BEE HALICTUS.

AXEL LEONARD MELANDER AND CHARLES THOMAS BRUES.

During the months of summer every roadside presents a field of busy insect-activity, as varied and interesting as it is unseen and unheeded. Those insects, however, that we do notice are seen during their idling moments and hence we are generally accustomed to stigmatize all as idlers with no aim beyond song or frolic. But insects have a busy life — another phase of their existence which many of us overlook. If we inspect some roadside more attentively we shall be surprised to see many of the self-same idlers working with diligence. Spurred by parental anxiety these insects excavate their nests and store them with food, doing for their young what their parents have done for them.

Out of this multiplicity of insect-life we shall select as an example one of the burrowing bees of the genus *Halictus*, and endeavor to tell what may be seen on any summer day. *Halictus* (*Chloralictus*) *pruinosus* Robertson is a brilliant greenish bee, measuring about one third of an inch in length, which lives over an extended range, occurring from New Mexico, through Illinois, to Massachusetts. It is the commonest Halictine at Woods Hole, in the last-mentioned state, where the following observations were made. During the early part of summer these bees commence their excavations along the roadsides wherever a sandy slope presents a favorable situation, and continue their activities until early autumn, the colonies increasing in size, and becoming more closely settled as the season advances. They seem to be in the height of their vigor during the early part of September in this region. Although their social instincts are not so highly developed as those of *Apis* or *Bombus*, these bees depart in their habits from the strictly solitary bees in that a male and two or three females are generally necessary for the successful direction of a single ménage. Moreover, a large number of nests are usually associated as a colony which may be scattered over a considerable distance or so populous that the tunnels almost intersect by their irregularities. The openings to the nests, however, are always separated by a distance of two or three inches or more. It can thus be readily seen that *Halictus* lives under conditions more or less similar to those of their more gregarious relatives, the ants, and hence it is not surprising that they are forced to harbor the same class of guests, and to be exposed to the same vicissitudes as are their cousins.

In constructing their nests the bees dig by means of their mandibles in the sandy clay, forming a hole of a diameter only slightly greater than will admit the largest female. The wall is then banked up with a plaster formed by the aid of saliva. Immediately behind the entrance is a short blind passageway, only large enough to allow a bee to turn on itself within.

This niche, which is always less than an inch from the entrance, serves simply to allow the bees to pass one another in the interior of the nest. From this point the gallery extends nearly straight back into the hill side, for a distance of a few inches and then slopes downward to the end — a total length of a foot or so. Near the further end jut a number of small diverticula radially extending from the main tunnel.

These are the nurseries of the young bees, where are stored the pollen and honey which is destined to serve as food for the bee larvæ of the coming generation. The excavation of the tunnels is a matter of considerable toil, requiring many days for its completion, but so industriously do the little bees work that at the close of day a miniature mound of sand has accumulated on the hill-slope below the opening. During the warm portions of the day the site of each colony of nests is a scene of inspiring activity. The air is filled with an ever-changing swarm of bees, each bent on its own task of excavation or of collecting honey and pollen, while from the openings of completed nests others can be seen peering about and eying everything that comes within their range of perception. At night everything is quiet, the trespassers and robbers, too, have ceased their work, and the colony slumbers in peace.

The structure of the nest was ascertained by the ingenious plaster-cast method advocated by Prof. J. B. Smith. By this means the galleries of *Halictus* are seen to depart but little from those of the other burrowing bees. A passage-way for exit and entrance in addition to the regular one opening on the dumping ground, such as is constructed by *Augochlora humeralis* Patton,[1] was never noticed in the case of *H. pruinosus*, the vigilance required to guard two openings having probably prevented such an extravagance. All the burrows which we dug out, a dozen or so in number, extended in a nearly horizontal direction, and were always built on the very steep slopes along the roadsides. By this means none of the excavated dirt accumulated about the doorway, which was even cleared of all débris with but little effort on the part of the bee. The relatives of *pruinosus* in Texas, morphologically of the same species, select a level spot for their nesting-site, dig vertical burrows, and place the accumulated dirt in an irregular cone about the opening. A photograph of these nests is given for comparison.

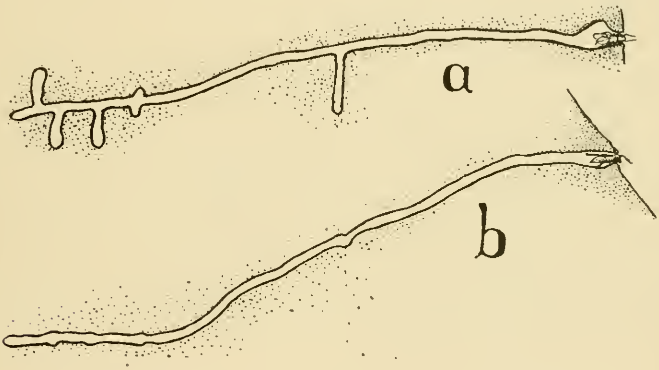

Fig. 1. Diagram of *Halictus* nest. *a*, plan; *b*, elevation.

During the latter part of nest-construction when the pollen has been gathered and the eggs laid, their home is continually threatened by thieves and kidnappers against whom a guarded watchfulness must be maintained. The sentinels are generally the males, who sit at the doorway, their rounded heads neatly filling out the entrance. When the female returns pollen-laden, the little guard slips into the first side passage while she enters, and then as quickly returns to his post. The incomers are perceived at a distance of half a foot, probably announced by the buzzing of their wings. Even when the little watchers can not see the female coming they dart half way out of their retreat at her approach. With antennæ vibrating and mandibles spread the males either manifest a joyful greeting for their nest-mates or show an equal degree of hostility towards any stranger that may venture too near.

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[1] J. B. Smith, *Proc. Am. Ass. Adv. Sci.*, 1898, p. 368.

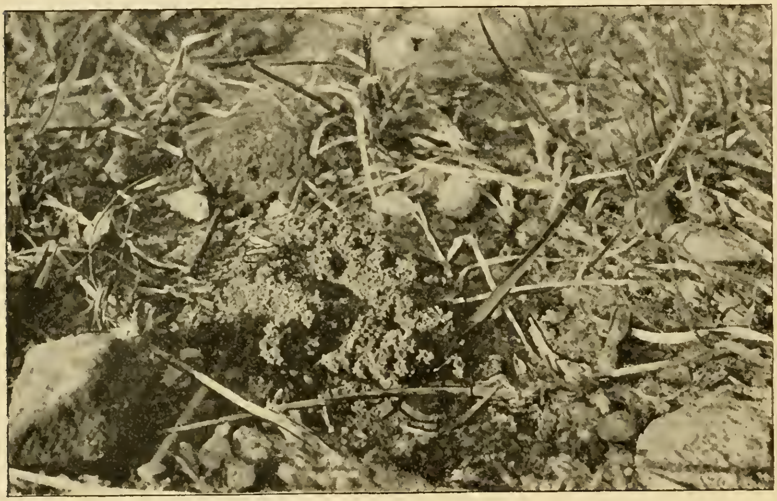

FIG. 2. Nest of *Halictus* near Austin, Texas.

The most dreaded of the enemies of the *Halicti* is perhaps the little velvet ant, *Mutilla canadensis* Blake, which is common nearly everywhere in North America, running about on the nests of these bees, its distribution practically coinciding with that of this species. Perhaps it is the stridulation produced by the abdomen of these intruders that arouses the ire of the guard at the door, for no sooner does one approach a nest than the watcher, if it be a female, rushes out and pounces upon the *Mutilla*, endeavoring to sting it to death. Down the hill-slope they roll, heedless of everything but an inborn desire to annihilate each other. The *Mutilla*, too, is armed with a powerful sting, half the length of her abdomen, but the sagacious *Halictus* grasps her enemy about the waist and most successfully evades the sharp thrusts. These combats continue for many minutes, concluded either by the invulnerable *Mutilla* slipping from the bee's grasp, for her body is hard and sleek, or by the death of the more plucky *Halictus*. Each colony, where everything seemingly is peace and content, is thus turned into a field of carnage, with the bodies of one or more females ruthlessly tumbled to the bottom of the hill. If the bee escapes unscathed, which happily is the more usual outcome of these struggles, she spends a few moments in preening her body, and then returns to her nest. But no greeting awaits her after her loyal struggle. When she hurriedly left the nest the male waiting his turn in the tunnel below quickly took her place as guard at the door, and now he blocks the entrance as obstinately as though it were a stranger begging admittance. The taint of *Mutilla* is still to be recognized on the body of the female and probably overpowers her family smell. For quite a minute she must remain at the door parleying with her mate before he is convinced of her identity.

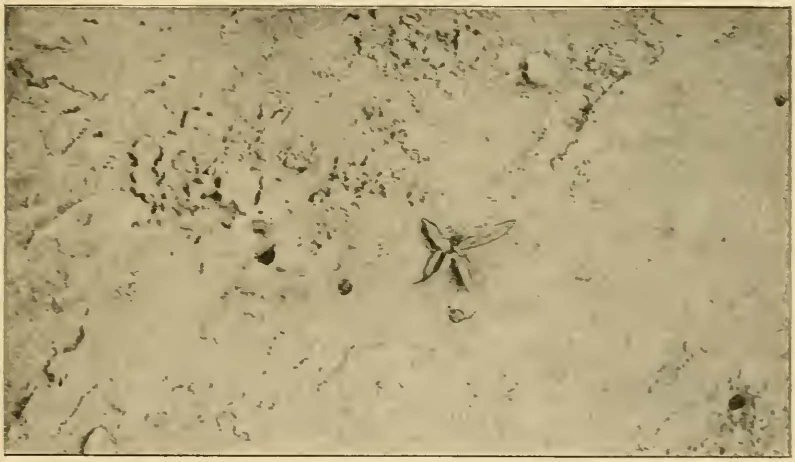

FIG. 3. Nest of *Halictus* at Woods Holl, Mass.

This observation is of interest when considering the organic dependence of instinct. Fear of *Mutilla* has been cultivated through natural selection and heredity till it manifests itself in the actions just recorded. But the conduct of the male towards his nest-mate, an inhospitable act which a gleam of reasoning intelligence would not permit under the circumstances, lends itself rather to the theory of a mechanical instinct, actuated in this case by the chemical nature of *Mutilla's* poison. If this be so it will be questioned why the bee does not behave as when *Mutilla* itself approaches. Does the mixture of *Mutilla*-influence and *Halictus*-influence compel an impassive head-on greeting while *Mutilla* alone induces the male-watcher to turn tail in the manner described on the next page?

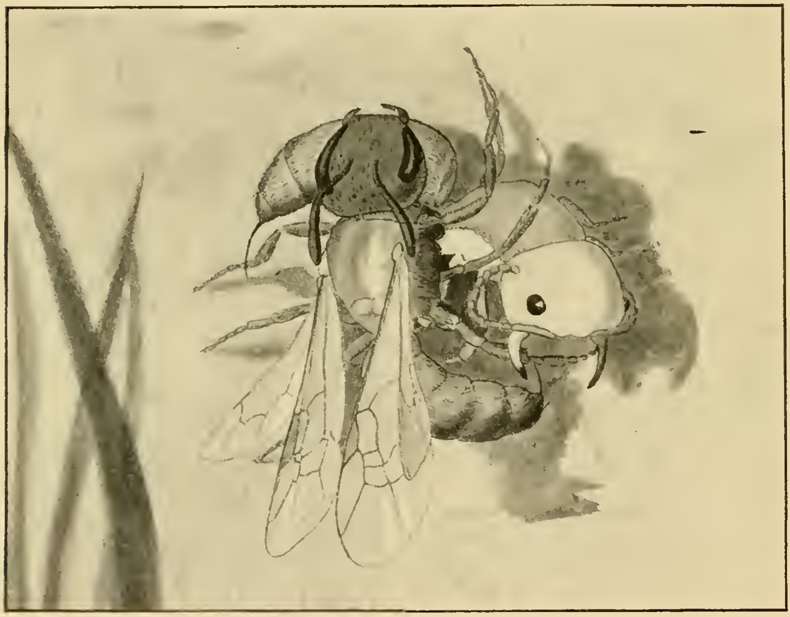

FIG. 4. Combat between *Mutilla* and *Halictus*. "Down the hill they roll heedless of everything but an inborn desire to annihilate each other."

One little bee once displayed an originality not noticed again. For fully twenty minutes she had waited at the entrance of her home, gently urging admission by advancing to the nest-opening once each minute. The male would retreat a short distance each time but not sufficiently far to admit the female, who would then retire, resting with her antennæ almost touching those of the stubborn gate-keeper. Finally she turned about and crept backward to the male, resting a moment with her sting before his face. When she now turned, the male seemed convinced, and the wearied female entered in the usual way. In this case did the female flaunt her own poison to overcome that of *Mutilla* as a passport to her home? It might seem so; but the simplicity of such a physiological action is quite equalled by the complexity of the intelligence displayed.

When a male bee guards the opening the approach of *Mutilla* produces a far different effect upon the watcher. Instead of rushing out on the marauder, the defenseless male adopts the less foolhardy measure of "turning tail," but still keeps at the entrance of the nest. Now the convex abdomen neatly fits the opening, forming a parasitic-proof shield, and *Mutilla* must needs leave. When no other bee is behind a female watcher, she never rushes out, leaving the nest unguarded, but adopts a manœuvre similar to the male's, but instead of inflexibly curving her abdomen over the opening, she reaches afar with her sting.

Canadensis, however, is not the only Mutillid that worries the Halictines. On numerous occasions *Myrmosa unicolor* Say[1] and *Mutilla infensa* sp. nov. were found crawling about, but these species do not appear to have become nearly so annoying. From one square meter of *Halictus*-colony fully fifty specimens of *canadensis* were taken during the summer, whereas in all but ten specimens of the *Myrmosa* were observed. *Mutilla ferrugata* Fabr. and *vesta* Cresson were also found prowling over the nests, though these species are doubtless parasitic on the larger burrowing insects which associate with *Halictus*, for the large size of their bodies would not permit entrance into the *Halictus* nests. Moreover, they may crawl quite close to the doorkeeper and elicit no attention; possibly their stridulation is pitched to an unresponsive key and their odor stimulates no reaction.

Almost as ardent a persecutor of the bees is to be found in a new species of *Phora*.[1] This little fly takes a stand near an opening and patiently awaits an unguarded moment. Then she quickly slips in to deposit an egg in the pollen so industriously stored. One *Phora* persisted in her attempts to enter for several hours. Driven back a half inch by the doorkeeper she gradually and slowly returned until she nearly touched his face. Then a sudden lunge half way out of the nest on the part of the bee would drive her back again. This was repeated over and over, the doggedness of the parasite and her slow approach seeming to exasperate the little watcher. By turning his head he tried to follow her movements, but from their very slowness was unable to discern her position. Only when his palpi were touched would he make a sudden dart. *Phora* depends on her agility as well as on her deliberateness. On each return of the female bee, after a fifteen-minute foraging trip, the parasite would jump about excitedly and possibly would get a chance to oviposit on the pollen mass during a dart at the bee. A moment's rest on the threshold would grant the nervous little fly ample time to infect the unsuspecting bee. The behavior of the bees towards *Phora* is quite different from the action of ants towards these guests. Unless irritated by the persistence of the parasite, *Halictus* is passive and does not notice its presence. Even the incoming females do not see the fly at a distance of half an inch. On the other hand, ants are put in a state of fright by the proximity of these flies. During the attacks of the ant-decapitating phorid, *Apocephalus Pergandei* Coq. upon the species of *Camponotus*, *ferruginea* in the north, and *maculatus* var. *sansabeanus* in the south, the ants rush in the wildest excitement with wide-spread mandibles at the agile fly. Can this difference result from the bees never seeing their offspring and being consequently unaware of their fate, whereas the ants have a personal acquaintance with the ravages of these parasites? It might seem so, but we must remember that in the case of *Pachycondyla harpax*, at least, a phorid larva is not only tolerated in the nest, but is also fed by its host.[2] In this case, however, no harm is done to the species by the presence of the fly, whereas with *Halictus* it must mean the death of the brood.

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[1] It is time to abandon superfluous names. *Myrmosa unicolor* Say, described as a male, and *M. thoracica* Blake, described as a female, have paraded in collections quite long enough as distinct species. Inasmuch as Mr. H. L. Viereck has recently taken the initiative (*Ent. News*, 1902, p. 72) in consolidating some of the species of Mutillidæ, we shall follow him in the nomenclature of this paper. The males of this species fly abundantly among the roadside flowers, in company with males of *canadensis* and *ferrugata* (= *castor* Blake = *Lepeleterii* Fox [*fenestrata* Lepeletier]).

[1] *P. halictorum*, described in the sequel.

[2] Wheeler, W. M., *Am. Nat.*, 1901, p. 1007 *et seq.*

The most conspicuous of the smaller Hymenoptera that frequent these grounds is a little species of *Loxotropa*. Time and again this insect was observed crawling stealthily over the nest-colony, tapping its antennæ on the ground as it moved. During this deliberate progress it covers an inch in four seconds, but as soon as its nears a selected opening its movement slows down to an almost imperceptible advance. Still holding its long and clubbed antennæ extended straight forward, their tapping now reduced to a slight nervous vibration, it gradually insinuates itself into the nest, even beneath the very jaws of the gatekeeper. Often after crawling so far into the nest that only the tip of its abdomen is visible, it finds the nest unsuitable. Then it deliberates no longer, but makes a hasty exit, leaving the astonished sentinel to reach in vain with questioning antennæ for its bold and impudent disturber.

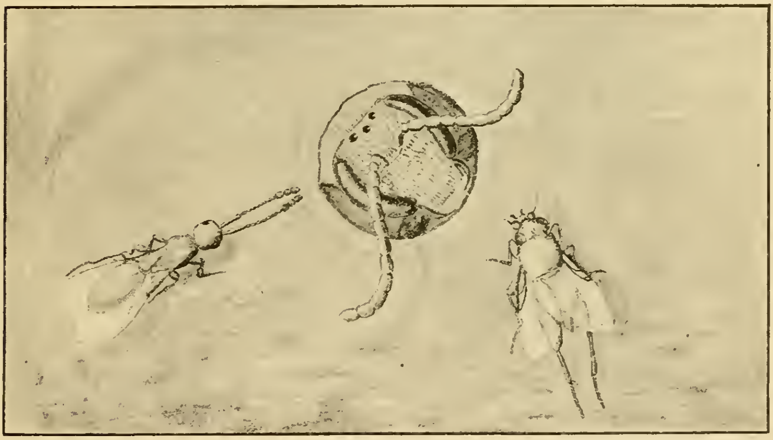

FIG. 5. *Loxotropa ruficornis* Ashm. *Halictus*, ♂. *Phora cata*, sp. nov.

As interested an observer of the incoming bees as is the *Phora*, is a tachinid fly. This species hovers over the breeding ground and suddenly circles over a particular hole. Is it attracted to the nest by the hollowness of the sound of its vibrating wings as it flies over an opening, or does it discern the state of advancement of the household below by an instinct less mechanical? Like its relatives, this species chooses the moment when the incoming bee pauses at her threshold quickly and quietly to oviposit on her pollen mass and thus infect her offspring.

A number of ants, foragers from near-by nests, are always to be found on the nesting-ground. These belong to harmless species which do not molest the bees. When an ant and a bee meet on the nest there is no encounter, each retreating good-naturedly to go her own way. The Stenammas, especially, have a stridulatory note as plaintive as that of *Mutilla*, yet this is unnoticed by the bees; even the watchers rest unaroused in their doorways while the ants pass them by. The little red thief ant is also found nesting in the midst of the bee-colony. Evidently it is here to ply its vocation of tunnelling into the chambers of the bees to steal from them their honey.

The little beetle, *Bæocera concolor*, seems quite at home with the bees. Although it belongs to a family of fungus-beetles, it, nevertheless, must have some intimate connection with the bees, as it was repeatedly observed running familiarly in and out of the nests. It is quite possible that it may live upon the pollen in deserted nests which has become mouldy by the growth of fungus hyphæ. The mixture of pollen and honey is thus readily turned into a mass of fungus under certain conditions.

The woes of the Halicti are not yet at an end. Another insect is as persevering in its depredations as its colleagues, and accomplishes by boldness what the others try by stealth. This is a larger foe, *Philanthus punctatus* by name, which audaciously builds its nest in the center of the *Halictus* colony, and when ready swoops down on a bee, stings it to death, and carries it home. Not one but many bees meet this death at the sting of their unsuspected neighbor, who plans her murders so that they take place at the flowers where the bees are at work.

When we consider the persistence of the Mutillas we can appreciate the extent to which specialization in keeping the nest parasite-proof has been carried by this bee. Seldom are the entrances left unguarded, and never is a stranger bee granted admission. In this respect *Halictus* is far more conservative than the wasp *Trypoxylon.* Although mistakes in selecting their own domicile from a cluster of fifty similar nests were frequently made, the watchers always recognized these visitors as strangers and were instantly ready to show fight. *Trypoxylon*, a wasp which also guards its doorways, on the contrary, makes no objection to the free entrance of visitors of the other sex, as has been shown by the Peckhams.[1] *Mutilla canadensis* appears to be the most dreaded enemy, as it alone is noticed by the bees. With a little reasoning ability many of the other parasites could be readily annihilated, whereas no move is made for protection against these foes except by the guard at the door. But how are the bees to know, even in the case of *Mutilla*, that their guests mean harm to their progeny? Probably they do not in a strict sense. It is evident, however, that the instinct of guarding the entrance to the nest could have been developed through the action of natural selection of favorable variations in habit, while it would be difficult to derive a number of specific reactions towards the different guests in the same manner. The very commonness of *Mutilla* and its conspicuous size are probably the reason that a specific reaction has been developed in this single case. *Halictus* is far less sensitive to its surroundings than many of the fossorial wasps are, coming and going even though we dis-

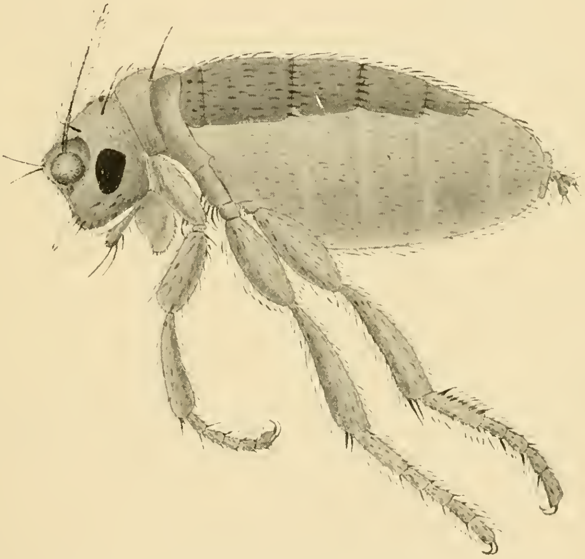

FIG. 6. *Stethopathus occidentalis*, sp. nov., lateral view.

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[1] "Instincts and Habits of the Solitary Wasps," p. 79, 1897.

turbed the nest and remained close by. Its one fear is centered in *Mutilla*. With thief-ants to rob its nests, parasites to prey on its offspring, and in constant danger of being carried away bodily by a wasp, itself numerous in individuals, it is remarkable that *Halictus* should have become a dominating type throughout such a wide territory.

This ends the list of the enemies of the bees as we have observed them. Many other insects abound on the nesting-site, but most of these, at least, are accidental visitors which neither harm nor are harmed. Several beetles, spiders, flies and other insects are included in this list which we give for reference in conclusion. The smaller species live near the *Halictus* as they would do anywhere, and not through preference, and the larger ones in part are attracted to our observation ground to prey on the smaller. These transients are such as a careful observation of any limited field would bring to notice. They are the participants in life's continual struggle, each seriously and unwittingly playing its part.

PART TWO.

A List of the Insects, Including the Accidental Visitors, Found About the Colonies of Halictus pruinosus, Robertson, at Woods Hole, Mass.

July–August, 1902.

Class ARACHNIDA.

Epeirid sp.

A minute larval spider was several times seen. It has no connection with the *Halictus*.

Bathyphantes formica Emerton.

Quite a number of specimens of this strange spider were observed running in their zigzag course over the ground. Like the last it is an accidental visitor, occurring on the colony during its search for food. We are indebted to Mr. Nathan Banks for the determination of this species.

Acarina spp.

Two species of mites were obtained, one of which (*Bryobia pratensis* Garm. ?) occurred in numbers.

Class MYRIAPODA, DIPLOPODA.

Polyxenes fasciculatus Say.

Numerous specimens found crawling about on the sand.

Class INSECTA.

Order **Thysanura.**

The genus *Podura*, represented by many specimens, was found associated with the former.

Order **Hemiptera.**

Aleurodes sp.

The larval form of an Aleyrodid was discovered on the nest. Probably it is that of *A. corni* Hald., the commonest form of the Atlantic States.

Order **Diptera.**

Family CHIRONOMIDÆ.

Ceratopogon hollensis sp. nov.

Third vein in part confluent with the first, ending much beyond the middle of the wing, wings in large part hairy, not uniform in coloration, but not spotted; eyes well separated; tarsal claws simple, of an equal length; legs not spinose beneath; metatarsus much longer than the second tarsal joint.

Female. — Head fuscous, proboscis black. Antennæ fuscous, the joints uniformly moniliform, slightly longer than broad, the last two joints longer. Eyes widely separated, the front yellowish. Mesonotum pruinose, sparsely and uniformly covered with short black bristles. Abdomen dark fuscous, lightly gray pruinose, apically hairy. Pleuræ paler fuscous, smooth. Halteres dark fuscous, the stems paler. Legs slender, uniformly yellowish, except that the knees, and the tips of the femoral and tarsal joints are very narrowly black; tibiæ provided with several simple long but slender hairs on the outer edge; no bristles below, tarsi somewhat hairy, claws small, uniform, simple, empodium small. Wings sparsely covered with short bristle-like hairs, more or less serially arranged. These become obsolete at the very base, cinerascent with a pale brown tinge becoming stronger along the basal part of the course of the anterior heavy veins, gradually interrupted in front of the anterior cross-vein, then gradually recommencing to end abruptly before the tip of the first vein. The crotch of the furcation of the light vein crossing the anterior cross-vein is darkened by an accumulation of pigment and by an increase in the number of hairs.

Length, 0.85 mm.

Woods Hole, Massachusetts, August, 1902.

The nearest relative of this species is *C. variipennis* Coq.

It is not unlikely that the species is an halictophile, as it was several times seen upon the nests, thus suggesting its myrmecophilous relatives. It may also be the cause of the presence of some of the proctotrypidæ here listed, as some of them are known to prey on the larvæ of various species of the genus. This is the case with *Adeliopria* Ashm., a Diapriid, which is parasitic on a Texan species of *Ceratopogon.*[1]

Family MYCETOPHILIDÆ.

Sciara sp.

A *Sciara* would frequently fly over the nesting-site and alight on the open ground. It is an accidental visitor more at home in the nearby grass.

Family PHORIDÆ.

Phora halictorum sp. nov.

Female.—Length, 1.5–2.25 mm. Head black, subshining, antennæ black; palpi dull yellow, with stiff black bristles below; proboscis not exserted; front long, flattened, punctured, shining, its bristles reduced in size, and those of the middle row placed high up. Anterior four proclinate bristles small, the remaining ones placed normally.

Thorax black, subshining, the dorsum finely pubescent, the pleuræ lightly pruinose, ten bristles present on the hind edge of the mesonotum, dorsum with one pair of dorsocentral and four marginal scutellar bristles.

Abdomen black, shining though not brilliant, not bristly, lightly pruinose basally along the sides; ovipositor short, retractile, piceous.

Legs piceous, front legs somewhat lighter, front coxæ dull yellowish, middle and hind coxæ piceous, hind coxæ with the usual ridge on the posterior side; hind femora stoutest, twice as thick as the front ones, middle femora intermediate, all the tibiæ with short bristles, biserially arranged on their outer side, those of the front tibiæ ten to twelve in number and approximated into one line towards the inner forward edge, those of the other tibiæ in two separated series, for the middle tibiæ four in the outer and six in the inner row, and for the hind tibiæ seven in the outer and ten in the inner rows; front tibiæ without terminal spurs, middle tibiæ with one long spur three fourths the length of the metatarsus, hind tibiæ with two moderately long spurs, the outer one two-thirds as long as the inner, which is nearly as long as that of the middle tibia.

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[1] See Wm. H. Ashmead, BIOL. BULL., 1902, p. 15.

Wings hyaline with faint cinereous tinge, not brilliantly iridescent, the heavy veins nearly black, reaching very nearly to the middle of the wing. First vein but slightly bowed, third vein nearly straight, furcate, costal bristles fine and short, thickly placed, distributed as follows: four proximal to the humeral cross vein, twenty-two (double series) bordering the costal cell, ten (double series) bordering the marginal cell, and six (in double series) along the submarginal, *i. e.*, the furcation of the second heavy vein. Thin veins dark, the fourth longitudinal slightly flexed only at its extreme base, so that the cell in front is slightly wider than the one behind, ending a little closer to the wing-tip than the second light vein does, seventh vein evident, extending into the wing-margin. Halteres whitish, their stem dusky.

Male.—Length, 1.75 mm. Differs as follows: frontal bristles stouter, abdomen smaller, genitalia not distinct, small, the central filament fleshy, short, directed backward. Tibial setulæ and the inner spur of the hind tibiæ reduced in size, ridge of the hind coxæ large; costal bristles not uniform, disposed thus: prehumeral four, twenty along costal cell, four along marginal cell and four along the submarginal. The inner bristles are minute, becoming larger at the third pair of the costal cell, and from thence are much stronger than in the female.

Described from several specimens, collected as described in the previous account at Woods Hole, Mass., July–August.

This species is related to *agarici* Lintner[1] but differs by the longer bristles on the tibiæ, longer front, four scutellar bristles, etc. The habits also are quite different, as *agarici* feeds upon decaying mushrooms.

Phora rostrata sp. nov.

Female.—Length, 1.5–1.75 mm. Black, shining, legs more or less yellow, lower frontal bristles proclinate, third vein forked.

Head shining black, especially smooth and polished on the front and vertex. Front with the normal chætotaxy except that there are only two proclinate bristles at the lower edge. The front is also sparsely hairy besides the large bristles. Median longitudinal groove and ocellar tubercle unusually well-marked. Antennæ black, with a distinctly plumose arista. Proboscis piceous, very large and strongly exserted, as long as the head-height. It is slender at the base where the rather small bristly spindle-shaped black palpi are inserted, then much enlarged, swollen and bifurcated at the extremity. The bifurcation is produced by a splitting of the apex by a horizontal slit in the proboscis. Thoracic dorsum shining, hairy as usual, with one pair of dorsocentral and two scutellar bristles. Abdomen black, nowhere bristly. Legs pale yellow, the tarsi sometimes brownish; hind tibiæ very indistinctly ciliated and with a single weak spur, as have also the middle pair. On the inner side at the apex the posterior pair have several transverse rows of short black bristles. Wings yellowish hyaline, the costal vein reaching distinctly beyond the middle of the wing and with very short cilia. First vein ending a little closer to the tip of the second than to the humeral cross vein. Fourth vein evenly arcuate, fifth vein sinuate as is also the sixth; seventh vein present. Halteres yellowish, blackened at the tips.

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[1] 10th N. Y. Rept., pp. 399–406.

Described from two female specimens collected at Woods Hole, Mass., July 15, 1902, about the burrows of *Halictus pruinosus*.

This species is readily recognizable on account of the excessive development of the proboscis, which is evidently adapted to some peculiar method of food-getting. It is also characterized especially by the very shining front, which seems to place it near to the European *P. minor* Zett., with which it agrees is some other characters.

Phora cata sp. nov.

Male and Female. — 0.8–1.2 mm. Black, legs and palpi yellowish or brown, antennæ of male enlarged. Anterior frontal bristles proclinate.

Head black, front short, about as wide as long, subshining, faintly gray pollinose in the male, two anterior bristles proclinate, the others all present and arranged as usual. Antennæ wholly black in the male, in which sex the third joint is enlarged and ovate so as to be very conspicuous, in the female they are of the usual size and slightly yellowish at the base; arista pubescent. Palpi light yellow, strongly bristly. Proboscis of female projecting, stout and horny. Thorax shining, black, hairy, with one pair of dorsocentrals and two marginal scutellar bristles. Abdomen black. Legs yellowish-brown, the anterior pair lighter. Posterior femora ciliated below on apical half, their tibiæ without any rows of small bristles on the outer side; four posterior tibiæ each with a delicate apical spur. Wings hyaline, the costal vein not quite reaching to the middle of the wing, its cilia short and closely placed. Third vein far from the costa at its base, and forked very near the apex. Tip of first vein twice as far from the humeral vein as from the tip of the second. Fourth vein slightly but evenly curved, recurved at the extreme tip. Fifth slightly diverging from the fourth to its tip, which is as far behind the wing tip as the fourth is before it. Seventh vein faint but distinct. Halteres yellowish in the female, piceous in the male.

Described from a single pair from Woods Hole, Mass. The lighter color of the female is most likely due to her apparently immature condition. They were taken on the sand in the midst of a colony of *Halictus*.

This species can readily be recognized in the male sex by the enlarged third joint of the antenna. The female is not so characteristic, but can be distinguished by the combination of structural characters given in the description. It resembles most closely *P. agarici* Lintner, but has very short costal bristles.

Stethopathus Wand.

Among the insects frequenting the ground immediately about the *Halictus*-burrows was one extremely small form, which from its quick motions we immediately suspected to be a wingless phorid fly. Such it indeed proved to be, but of quite a different sort from any of our previously discovered North American species. Its occurrence in New England is quite unexpected and considerably extends the range of such forms, as none have hitherto been seen in America north of central Texas.

Its associations with the *Halictus* may be doubtful, although no specimens could be found elsewhere whereas three females were captured where the burrows of the bees were abundant. Nests of *Lasius niger* and of *Stenamma fulvum*, variety *piceum* also abound in such locations, but close scrutiny of the ant nests revealed no specimens of the Phoridæ. The fact that species of *Phora* occur as parasites of these bees would make it seem not improbable that the *Stethopathus* has similar habits. We have also a single winged male phorid, captured at the same time, but which is probably the male of some other undescribed form on account of its larger size and the different chætotaxy of the head. The description of this interesting little wingless fly, one of the smallest known of all the Diptera, is given herewith.

Stethopathus occidentalis sp. nov.

Female.—Head rounded triangular, much rounded on the sides and at the hind angles and obtusely pointed in front, about two thirds as long as wide above, vertex descending rather steeply and evenly. Eyes small, about one and one third times as large as the second antennal joint, coarsely facetted with hemispherical ommatidia as usual. Antennæ placed at the bottom of the deep frontal cavities. Proboscis long and stout, equal to the head-height ; palpi small and slender, thickest near the tips, with stout macrochætæ on the inner side. Ocelli present, placed in a small triangle on the vertex. Head with four closely approximated macrochætæ at the middle of the front margin, two widely-separated ones near the anterior corner of the eye directed inwards and two outwardly directed ones near the posterior angles ; a series of small macrochætæ below and in front of the eye.

Thorax small, twice as wide as long, truncate before and behind ; sinuate on the sides and narrowed behind, so that the pleuræ are slightly visible from above. Thorax rather sharply arched above, and much narrowed below on the sides. Dorsal surface with a pair of long macrochætæ just behind the anterior angles and four smaller marginal ones along the posterior edge.

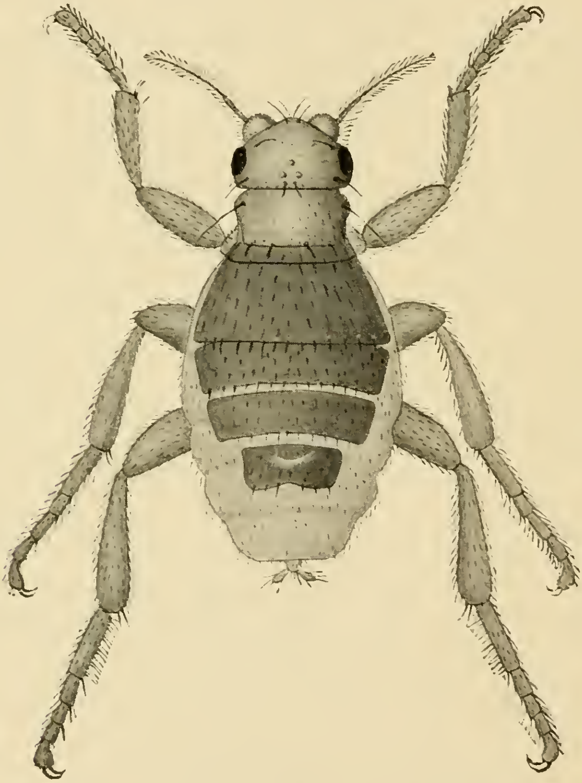

FIG. 7. *Stethopathus occidentalis* sp. nov., dorsal view.

Abdomen considerably swollen, but with large and strongly chitinized dorsal plates. The first is only a narrow band, contiguous with the second which is very large and contiguous with the third. The fourth and fifth are separated by a white membrane such as covers the abdomen elsewhere. Seen from above the abdomen is twice as wid as the thorax and flattened, oval in cross-section. No ventral sclerites are present. Each segment is margined behind with small bristles and is hairy elsewhere as is the entire body. Glandular opening of the fifth segment[1] in the shape of an arcuate slit. External genital organs of the usual form. Legs rather stout, the tibiæ with two apical spurs.

Length, 0.75 mm. Testaceous, head and thorax darker above, especially directly about the ocelli. Abdominal plates dark fuscous, the membranous parts almost white, with a small fuscous spot at the insertion of each hair.

This form is a typical representative of the Stethopathinæ and strange to say, it approaches more nearly to the East Indian *Stethopathus ocellatus* Wand. than to any of the species that have hitherto been discovered in America. Indeed, it is here regarded as congeneric with the former, although the two species are from such widely separated regions of the earth.[2] It may be necessary later to separate these two forms, but at the present state of our knowledge of this group it does not seem advisable. The American species resembles *S. ocellatus* Wand. in possessing ocelli, being utterly destitute of wings and halteres, and in having a similarly shaped head and abdomen. But differences in form are also evident: the thorax is only twice as wide as long, instead of three times as in *ocellatus*, the palpi are clavate, not spindle-shaped, and the chætotaxy is somewhat different, although conforming to the same general type. Although its habitus seems to be quite different from that of the genus *Ænigmatias* Meinert (which it may be recalled, has just been discovered in Arizona,[3] a locality quite distant from its home in Denmark), yet this species may possibly prove to be a close relative.

A point perhaps of minor importance, but nevertheless interesting as bearing upon its systematic position, is the fact that the

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[1] In previous papers the gland opening has been referred to the fourth segment of the abdomen, but the very short first segment in the present species leads us to believe that this sclerite is concealed in the other American species and that there, too, the gland really opens on the fifth segment.

[2] Many cases might be mentioned of monotypical or very small genera of insects which have an inexplicably wide discontinuous distribution. *Amphizoa* with two species, one in western North America and another in Tibet; *Syntelia*, which is represented by two species, occurs in Mexico and eastern Asia; and the water-beetle, *Pelobius*, occurring in western Europe, Tibet and Australia. For further references to the close approximation in certain details of the faunæ of eastern North America and Asia, see C. C. Adams, "The Southeastern United States as a Center of Geographical Distribution of Flora and Fauna," BIOL. BULL., Vol. III., pp. 115, et seq.

[3] D. W. Coquillett, *Can. Ent.*, 1903, p. 20.

American species has, like the East Indian form, bare, non-pubescent macrochætæ, while the other American species of this subfamily have them pubescent.

Family TACHINIDÆ.

Metopia leucocephala Rossi.

The interested observer of the *Halictus* mentioned in the first part was captured for identification, and proves to belong to this widely distributed species.

Order **Hymenoptera**.

Family BRACONIDÆ.

Subfamily CHELONINÆ.

Chelonus brevipennis sp. nov.

Female.—Length, 2 mm. Ferruginous, head piceous black, wings reaching just beyond the base of the abdomen.[1] Antennæ 21-jointed, tapering as usual, and almost as long as the body, ferruginous at the base, black at the tip, the third joint four times as long as thick, the apical joints more or less quadrate-moniliform. Eyes smaller and less densely hairy than usual. Head almost smooth above, shining, thinly pale pubescent, piceous black above, ferruginous below, palpi yellow. Thorax ferruginous, pronotum coarsely rugose reticulate above, mesonotum less distinctly so, metanotum small, quadrate, not toothed at the posterior angles, rugoso-reticulate ; pleuræ not roughly sculptured, somewhat shining. Abdomen with no traces of sutures above, dark ferruginous and sparsely white hairy ; gradually broadened from the base and rounded at apex ; finely and irregularly reticulately striate longitudinally, especially at the base. The incurved margin is emarginate at the apex of the abdomen. Ovipositor stout, black. Legs long and slender, yellow, the femora clavate.

Described from a single female specimen collected at Woods Hole, Mass., in a burrow of *Halictus pruinosus.*

The present species seems best referable to *Chelonus* because of its pubescent eyes. The apex of the abdomen however is emarginate, somewhat as in *Gastrotheca* Guérin. Unfortunately as the wings are rudimentary they can not be used to determine its affinities. The only other apterous species belonging to this subfamily are included in *Acampsis* Wesmael, from which the present form differs by its unsegmented abdomen.

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[1] For neuration, see BIOL. BULL., 1903, p. 189, Fig. 5.

Family CHALCIDIDÆ.[1]

Eupelmus rhizophelus Ashmead.[2]

This remarkable chalcidid with vestigial wings in the female was seen rather commonly about the *Halictus* burrows. As it has been previously bred from cynipid root galls by Mr. Ashmead, it is no doubt an accidental visitor to the bee nests.

Eupelmus Ashmeadii sp. nov.

Female. — Length, 3.5–4 mm., ovipositor 0.5 mm. Shining green varied with ferruginous on the thorax and with luteous and black on the abdomen. Head shining green, with a sparse white pubescence. Mandibles brown, black at the tips, palpi black. Antennæ long, the scape yellow, reaching to the ocelli, flagellum black, about once and one half the head-height, last joint acutely pointed. Head less than twice as wide as long, the space between the eyes above narrow, so that the lateral ocelli are close to the eye-margin. Face rugoso-punctate with a median carina extending from the clypeus to the insertion of the antennæ. Prothorax shining brown. Mesonotum very closely punctate, not at all shining, brown in front and green behind, concave medially behind, on each side of the depression it is raised and almost carinate, then slopes down to the reflexed margin ; anteriorly it is raised to form a broad triangular tubercle. Pleuræ ferruginous except in front where they are green. Metanotum golden, closely punctate, bilobed, sharply declivous, forming a right angle with the mesonotum. Wings deeply infuscated, paler at base and slightly so at apex, with a narrow cross band of white just before the stigmal vein. Marginal vein equal to one third the length of the wing, stigmal vein moderate, one half the length of the post-marginal. Abdomen shining black, pale luteous on the basal third. Sheaths of the ovipositor bright ferruginous, almost as long as the abdomen. Legs brown, darker on the front and hind femora, tarsi yellowish except the tips.

Described from three female specimens collected at Woods Hole, Mass., July and August, 1902.

This pretty species was associated with the much smaller brachypterous species, *Eupelmus rhizophelus* Ashm., on the burrows of *Halictus pruinosus*. It is named in honor of Mr. Wm. H. Ashmead, who determined it as an undescribed species.

Henicopygus subapterus Ashmead.

We have seen this species running actively about on the ground among *Halictus* burrows at Austin, Texas. Like the species of *Eupelmus*, it may be an accidental visitor.

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[1] We are indebted to Mr. Wm. H. Ashmead for his kindness in determining the species of Chalcididæ.

[2] For wing-neuration, see BIOL. BULL., 1903, p. 189, Fig. 7.

Encyrtinæ gen. et sp. indesc.

Among the Chalcididæ there is a single specimen which Mr. Ashmead, who has kindly examined it, informs us represents an undescribed genus of Encyrtinæ. Unfortunately it is too poorly preserved to permit of an accurate characterization in the large and difficult group to which it belongs.

Cirrospiloideus (Miotropis) platynotæ Howard.

A single female of this species was captured.

Superfamily PROCTOTRYPOIDEA.

Family Scelionidæ.

Telenomus sp.

There is a single pair representing an apparently undescribed species in this large and difficult genus.

Caloteleia Marlattii Ashmead.

This active little species is a regular visitor about the nests.

Caloteleia parvipennis sp. nov.

Female. — Length, 2.5 mm. Yellow, varied with darker. Head black, very smooth and polished above the antennæ, finely punctured on the vertex and with larger punctures intermixed. Mandibles yellow at the base, black at the tip. Antennal scape pale yellow, reaching a little above the vertex, the pedicel small and rounded, yellow, the flagellum about one and one half times the length on the scape, black, the first flagellar joint twice as long as the pedicel, then the joints decrease in size to the fourth, the following six forming a thick oval club with closely articulated joints. Thorax entirely yellow, except the tegulæ which are black, mesonotum finely punctulate, with two rather faintly marked furrows, scutellum large, semicircular, smooth. Metathorax very short, emarginate in the middle, smooth on the sides. Abdomen polished and perfectly smooth, except for coarse longitudinal striæ on the first and at the base of the second segments. The petiole is short quadrate, and bears a quite distinct polished black tubercular horn at its base ; basal half of abdomen otherwise yellowish varied with brown, apical half black ; third segment longest, second nearly as long, others much shorter. Legs including the coxæ yellow. Wings short, reaching only to the middle of the abdomen. Marginal vein short and swollen, stigmal about one third as long as the lengthened postmarginal, costal margin sparsely ciliated.

Described from one female specimen taken at Woods Hole, Mass., on a slope that was thickly riddled with the burrows of

Halictus. When captured it made no attempt to fly, the wings evidently being too much atrophied to be of functional use.

This form can be readily recognized by its short wings. It does not seem to be very closely related to any of the other North American species.

Scelio ovivorus Riley.

This large and coarsely sculptured Scelionid was originally bred by Scudder from the eggs of the common New England grasshopper (*Dissosteira carolina*) so that its occurrence is evidently not connected with the presence of the *Halictus* colony. Nevertheless it was often seen intermingling with the bees.

Family Diapriidæ.

Loxotropa ruficornis Ashmead.

This is a common species always to be found on the breeding ground of these bees. Its habits have already been noted in the preceding part of this paper.

Family Bethylidæ.

Empyris subapterus sp. nov.

Female.—Length, 3.25 mm. Black, head and thorax subopaque, abdomen shining; antennæ, mandibles at tips, palpi, tegulæ and extreme tip of abdomen rufous; sparsely pale pubescent. Head about one third longer than wide, closely and finely punctate with fewer larger punctures intermixed. Antennæ reaching about to the tegulæ, scape stout and curved, three times as long as its thickness at the tip; following joints of about equal length, except the first flagellar, which is shorter; pedicel more slender, the other joints slightly wider than long. Eyes hairy, ocelli present. Prothorax sculptured like the head, with a transverse impressed line anteriorly. Mesonotum very short, less than half as long as wide, without grooves or furrows. Tegulæ rufous. Scutellum basally with a deep transverse linear fovea. Metanotum about one and one half times as long as wide, with a median longitudinal carina and a fainter one close on each side of it anteriorly, also a lateral and an apical carina present; surface elsewhere finely transversely rugulose; posterior face sharply declivous, shining and punctulate. Wings abbreviated,[1] just attaining the apex of the metanotum; with a small stigma near the apex, a narrow, submarginal cell and an equally long but wider basal cell; costal margin fringed. Legs, including the coxæ, dull rufous. Abdomen polished black, the margin of the penultimate segment and the apical half of the last segment ferruginous.

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[1] For figure see Biol. Bull., 1903, p. 189, Fig. 2.

Described from several female specimens collected at Woods Holl, Mass., running about among the burrows of a colony of *Halictus pruinosus* Robts.

This species greatly resembles *Mesitius* in habitus, but has a transverse furrow at the base of the scutellum instead of two foveæ. It can hardly be the undescribed female of *E. carbonarius* Ashmead, on account of the difference in the sculpture of the metanotum. It is apparently the first subapterous form to be described in this genus.

Family FORMICIDÆ.

Lasius niger Linneus.

Stenamma fulvum var. **piceum** Buckley.

Solenopsis molesta Say.

This last named species is the only one that derives any direct benefit from the presence of the bees.

Family MUTILLIDÆ.

Mutilla canadensis Blake.

This is the most conspicuous of the enemies of the bees. It has been fully noticed in the preceding part.

Mutilla infensa sp. nov.

Female.—Clothed with sparse appressed white pubescence becoming denser apically, and with scattered long erect hairs. The hairs are black on the vertex, dorsulum and second abdominal segment and become whitish on the under side of the body and beyond the second segment of the abdomen. Coarsely sculptured species ; head finely and closely punctate, thorax and petiole of the abdomen coarsely reticulate, abdomen much less deeply and more distantly punctured than the head, the apical segments with finer punctures, meso and metapleuræ shining, not or but little strigose, nearly smooth, pygidium longitudinally closely but irregularly striated, the striæ very weak and vanishing apically. Head quadrate, concave behind, in profile also rounded ; eyes prominent, round, subshining, their facets distinct ; mandibles straight, strong, pointed, untoothed ; scape stout, as long as the three basal joints of the flagellum, basal flagellar joints subequal. Thorax elongate-oval, nearly as broad as the head, the front margin and angles well defined, posterior surface of the metanotum not sharply declivous, somewhat flattened and rounded above. Petiole of the abdomen flattened above, constricted from the second segment, one fourth broader than long, its front angles sharp and prominent, its ventral carina weak, very obtusely angulate at the middle and minutely toothed in front. Legs slender, provided like the body with silvery erect hairs, four or more strong spines on the outer edge of the hind tibiæ, the tibial spurs and spines black.

Ferruginous or somewhat darker, the mandibles, the flagellum except its basal joint, *i. e.*, the third antennal joint, more or less of the second abdominal segment, and all of the other segments of the abdomen, from the third apically, both ventrally and dorsally black. Legs including the coxæ piceous or black. Second segment of the abdomen with a varying extent of the front margin, a diffused median vitta and the hind margin more strongly black or blackish. On each side of the median stripe is a pair of conspicuous rounded testaceous spots. Last ventral segment sometimes reddish.

Length, 4.75 mm.

Woods Hole, Massachusetts. Parasitic on *Halictus pruinosus* (?).

The edentate mandibles, the facetted eyes and the nodose petiole of the abdomen would lead one in placing this species in the small group *scrupea*, where it is obviously distinct from the only other known female by its rugose thorax, etc. Notwithstanding this, we shall have to disregard the well-marked ommatidia and place the species in the group *occidentalis*, intermediate between *cariniceps* Fox and *rugulosa* Fox, differing from each by the structure of the pygidium, etc., but related by its general habitus, sculpture and chætotaxy.

Mutilla vesta Cresson.

Mutilla ferrugata Fabricius.

Like the former species this too is doubtless parasitic on the larger Hymenoptera such as *Philanthus* or the Pompilidæ that nest near by.[1]

Myrmosa unicolor Say.

The males of this species fly about the roadside flowers while the females are frequently found about the bee nests. Their presence is undoubtedly due to the bees.

Family PHILANTHIDÆ.

Philantus punctatus Say.

This species was observed nesting in the very midst of several of the colonies of *Halictus*.

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[1] In Europe Sichel records *M. incompleta* Lep. as parasitic on *Halictus* (cf. Horæ, *Soc. ent. Ross.*, VI., p. 11) and *M. coronata* as a parasite of *Larra anathema* (*ibid.*, p. 12).

Sphex ichneumonea Linn., and a species of Pompilidæ were also seen digging their nests in the compact sand of the road in the vicinity of the bee colony. They have no connection with the presence of the bees, but associate with them as the same condition of soil and surroundings are suitable for each.

Order **Coleoptera.**

Family COCCINELLIDÆ.

Microweisea misella Leconte.[1]

The species of this genus are reported to be of great economic importance as they greedily prey on scale insects. The presence of the *Aleyrodes* may have had an influence in bringing this species to our notice.

Family ENDOMYCHIDÆ.

Aphorista vittata Fabricius.

Family PTINIDÆ.

Cænocara scymnoides Leconte.

Family SCAPHIDIDÆ.

Bæocera concolor Fabricius.

The last three species are fungus-eating beetles, which may come to the *Halictus* nests to feed on the fungus overgrowing the stores of abandoned or damp nests. It is certain that during the course of the season numerous nests are left unfinished, either deserted voluntarily by the bees for some whimsical reason or not completed by the death of the bees.

Family RHIPIPHORIDÆ.

Myodites fasciatus Say.

Inasmuch as Fabre and others have found the larvæ and pupæ of a member of this family in the cells of an European species of *Halictus*, it is quite interesting to note the occurrence of *M. fasciatus* about the colonies of the American form. Several specimens were taken while sweeping with the net among the swarming bees as they entered and left their nests.

Several other beetles were found crawling over the nest but were visitants too accidental to record.

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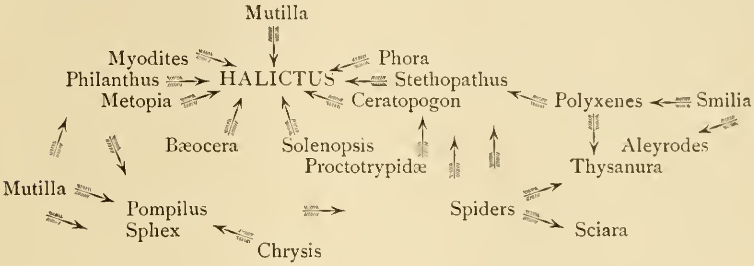
[1] This is the species known in our lists under the generic name *Smilia* or *Pentilia*. The present name was proposed by Cockerell (*Can. Ent.*, 1903, p. 38).

In conclusion we may present the following diagram showing the interrelationships of the most important of the insects we have observed. For *Halictus* it is indeed a "whirlpool of life" with only too many vortices centered upon its unfortunate self.



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